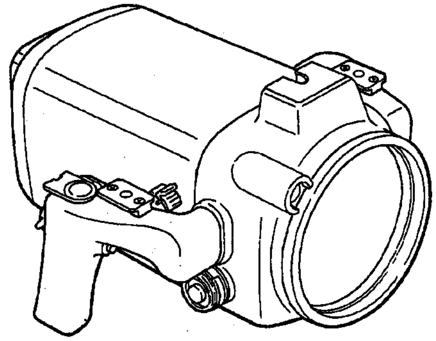
MPK-TRV1

SERVICE MANUAL

US Model
Canadian Model
AEP Model



Handycam

Difference Manual

This service manual only lists the differences with MPK-TRA2.
When repairing, please use it together with the MPK-TRA2/TRA2K service manual. (9-973-576-11)

Differences portion

- BASE ASSY, CAMERA
- There are no differences for accessories and packing materials and they are all listed.

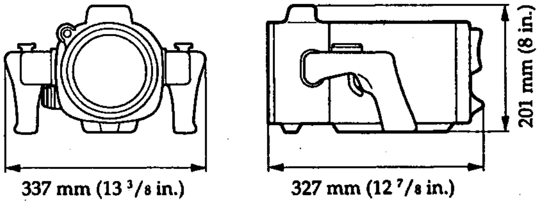
MICROFILM

MARINE PACK

SONY®

Specifications

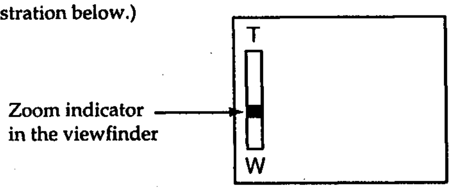
Compatible video camera recorder	See page **2**.
Material	Aluminum alloy, glass, plastic
Waterproofing	O-ring, 2 buckles
Usable depth	Up to 75 meters (246 feet)
Underwater microphone	Condenser microphone (monaural)
Controllable function	Power on/off, recording start/stop, auto focus on/off, power zooming
Dimensions	



Mass	Approx. 8 kg (17 lb 10 oz)
Supplied accessories	Adaptor (A,B,C) Mounting screw plate (1) O-rings (2) Grease (1) Accessory belt (1) Viewfinder adaptor (1)
Recommended accessories	Underwater video light **HVL-M20, HVL-80DA** Carrying case **LCH-M40**

Design and specifications are subject to change without notice.

If there are specks or dust in focus on the front glass of the marine pack, move the power zoom lever towards the T (telephoto) side slightly so that the zoom indicator inside the viewfinder moves towards T. (See the illustration below.)



We recommend you use a **wide-conversion lens** (not supplied) when using the marine pack.

Features

The **MPK-TRV1** marine pack allows the following 8 mm video camera recorders to be used underwater.

US, Canadian model

CCD-TR44
CCD-TR54
CCD-TR64
CCD-TR74
CCD-TR78
CCD-TR84
CCD-TR88
CCD-TR94
CCD-TR98
CCD-TR99
CCD-TR200
CCD-TR300
CCD-TR500
CCD-TR514
CCD-TR614
CCD-TR710*
CCD-TR714
CCD-TR814
CCD-TR910*
CCD-TR2300*
CCD-TR3000*
CCD-TR3300*
CCD-TRV11
CCD-TRV21
CCD-TRV30
CCD-TRV40
CCD-TRV41*
CCD-TRV70
CCD-TRV81*

AEP model

CCD-TR1*/TR1E*
CCD-TR3*/TR3E*
CCD-TR8*/TR8E*
CCD-TR18E*
CCD-TR330/TR330E/TR330BR/TR330PK
CCD-TR340E
CCD-TR410E
CCD-TR420/TR420E/TR420PK
CCD-TR440/TR440E/TR440PK
CCD-TR490/TR490E/TR490PK
CCD-TR510E
CCD-TR520E
CCD-TR590/TR590E/TR590PK
CCD-TR610E*
CCD-TR710E*
CCD-TR760E*
CCD-TR810E*
CCD-TR910*/TR910E*
CCD-TR2200E*
CCD-TR2300E*
CCD-TR3000*/TR3000E*
CCD-TR3300*/TR3300E*
CCD-TRV11/TRV11E
CCD-TRV21/TRV21E/TRV21PK
CCD-TRV30/TRV30E/TRV30PK
CCD-TRV31*/TRV31E*
CCD-TRV40/TRV40E
CCD-TRV41*/TRV41E*
CCD-TRV51*/TRV51E*
CCD-TRV60E
CCD-TRV61E*
CCD-TRV70/TRV70E
CCD-TRV81E*
CCD-TRV91*/TRV91E*

- **Recording at a depth of 75 meters (246 feet) is possible.**
- **The following operations can be performed underwater.**
  - Power on/off
  - Auto focusing on/off (Only models marked with *)
  - Recording start/stop
  - Power zooming

SECTION 1
GENERAL

This section is extracted from instruction manual.

Precautions

On the video camera recorder

Take care not to expose the equipment to salty air. Do not drip water on the equipment.

- Do not open the marine pack while at sea or at the seaside. Preparations such as installing and checking the equipment should be made in a place with low humidity and no salty air.
- When a video camera recorder is to be used near the sea for a long time, we recommend that it be checked periodically by a Sony dealer.
- If the equipment becomes wet, take it immediately to the nearest Sony dealer for preventive maintenance.

On power source for the video camera recorder

We recommend you use the battery packs with large capacity (except NP-99/4500).

On the marine pack

- If you open and joint the front and rear shells in a place with high temperature and high humidity, moisture condensation may occur when you put the marine pack in the water causing the front glass to fog.
- The waterproof integrity of the marine pack is maintained by the O-ring, and the groove and surface where it touches. Be especially careful not to damage or deform that area.
- Do not leave the marine pack under direct sunlight for a long period of time, otherwise the temperature in the marine pack may rise and the equipment inside may be damaged.
- If you cannot avoid leaving the marine pack under direct sunlight, be sure to cover the marine pack with a towel or other protection.
- Do not throw the marine pack into the water. Lower it gently into the water.

On recording underwater

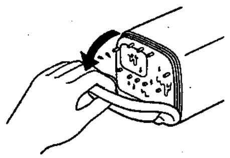
- Check that the equipment operates correctly and there is no water leak at a depth of about 3 feet (one meter) before you dive deeper.
- Be sure to follow the safety rules for diving such as diving period and depth.
- Remove the bubbles from the outside of the front glass.

Sony does not accept liability for damage to the video camera recorder, battery, etc. in the marine pack and for the cost of recording if water leak occurs caused by incorrect operation.

On maintenance

After recording in the sea, submerge the marine pack with the buckles tightly fastened in fresh water for a while to remove the sea water. Then rinse it with fresh water and dry it with a soft cloth.

- Every time after you use the marine pack and the video camera recorder underwater, clean the video camera recorder and the inside of the marine pack with a dry soft cloth. Do not use any type of solvent, such as alcohol or benzine for cleaning, as this might damage the finish.
- When you store the marine pack, grease the O-ring, put it in the groove correctly. Joint the front and rear shells and place it in a cool place without fastening the buckles. Avoid storing the marine pack in a hot or very cold place, in a place subject to direct sunlight or excessive dust, or together with naphthalene or camphor as. These will damage the marine pack.
- If water comes between the rear shell and the rubber part, remove the rubber and clean it with a dry soft cloth.

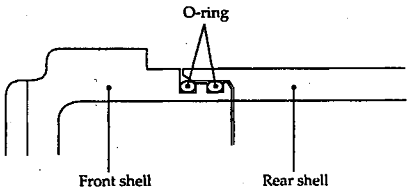


On transportation

- To transport the marine pack, be sure to remove the video camera recorder from the marine pack.
- To transport the marine pack by air or by car, use a marine pack carrying case (not supplied).

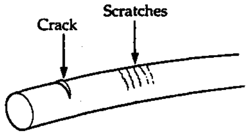
Notes on the O-ring

The O-ring assures the waterproof function of the marine pack. To maintain waterproof integrity, use it correctly. Incorrect handling may cause water to leak in.



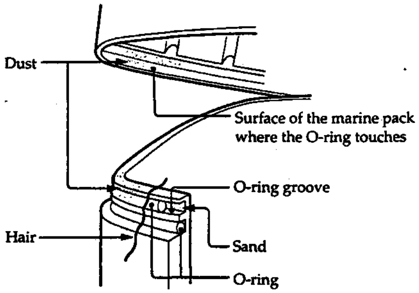
Check that there are no scratches or cracks.

Scratches or cracks on the O-ring may cause water to leak in. If the O-ring is damaged in this way, replace it with a new one. Do not remove the O-ring from the groove with a metal tool or a tool with a sharp point.



Remove any dust, sand or hair from the O-ring.

Make sure there is no dust, sand or hair on the O-ring, in the groove, or on the surface of the marine pack where the O-ring touches. If there is, clean them completely, or the O-ring and the surface of the marine pack may be damaged and water may leak in.

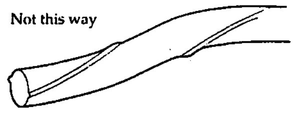


Grease the O-ring

The grease protects the O-ring from wear.
Check that there are no cracks or dust on the O-ring, then grease it using your finger. While greasing, double check that there are no cracks or dust.
Never use cloth or paper to apply grease because the fibers may cling.
Do not use any type of grease other then the supplied one, or it may damage the O-ring.

Do not twist the O-ring.

Put the O-ring in the groove evenly. Never twist it.



Do not pinch the O-ring with the marine pack.

When jointing the front and rear shells, take care not to pinch the O-ring between the front and rear shells. If this happens, not only will the O-ring be damaged, but water may leak in.

Storage

Put the supplied spare O-rings in the original carton and store it in a cool place.

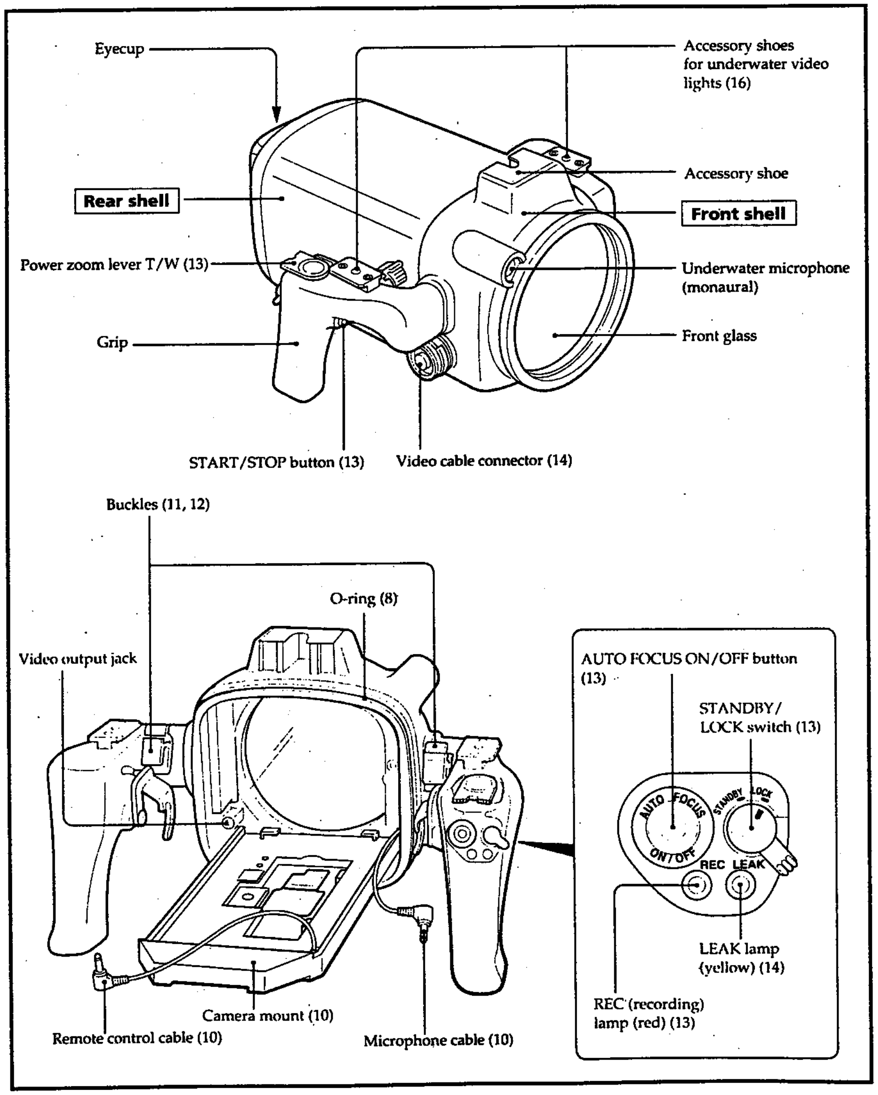
- Do not expose the O-ring to direct sunlight.
- Do not place a heavy object on the O-ring.
- Do not fold the O-ring.

Useful life of the O-ring.

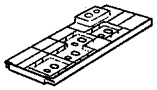
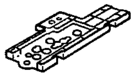
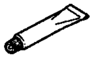
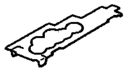
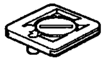
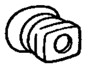
Depending upon the maintenance and the length of use, we recommend changing the O-ring every one or two years.
To replace the O-ring, plase consult the nearest Sony dealer.

Labeling the parts and controls

- For the use of each part or control, see the pages indicated in parenthesis.


Eyecup
Rear shell
Power zoom lever T/W (13)
Grip
Accessory shoes for underwater video lights (16)
Accessory shoe
Front shell
Underwater microphone (monaural)
Front glass
START/STOP button (13)
Video cable connector (14)
Buckles (11, 12)
O-ring (8)
Video output jack
Remote control cable (10)
Camera mount (10)
Microphone cable (10)
AUTO FOCUS ON/OFF button (13)
STANDBY/LOCK switch (13)
AUTO FOCUS
ON/OFF
STANDBY
LOCK
REC
LEAK
LEAK lamp (yellow) (14)
REC (recording) lamp (red) (13)

Supplied accessories

 Adaptor A (1)	 O-rings (2)
 Adaptor B (1)	 Grease (1)
 Adaptor C (1)	 Accessory belt (1)
 Mounting screw plate (1)	 Viewfinder adaptor (1)

Position of the adaptor and the remote control cable

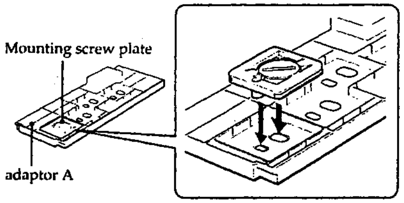
The position of the adaptor and the remote control cable depends on the model of the video camera recorder. Check the position for the video camera recorder you use.

Mounting instructions are explained in "Attaching the video camera recorder to the marine pack" on page **9**.

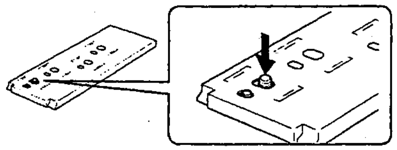
Position of the mounting screw plate on the adaptor

Put the mounting screw plate on the number of the adaptor depending upon the model of video camera recorder.

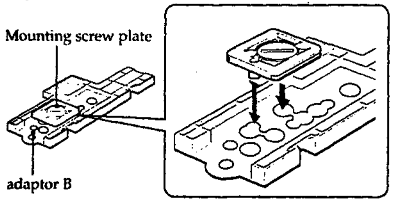
adaptor A



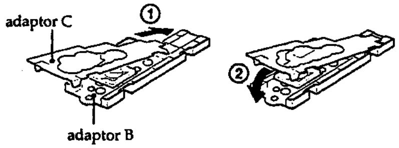
To disassemble after using.



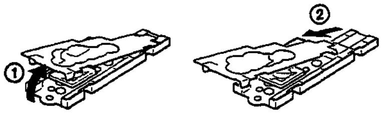
adaptor B



Attach the adaptor C to the adaptor B.



To detach the adaptor C from the adaptor B.



US, Canadian model

Video camera recorder CCD-	Position of the mounting screw plate on the adaptor	
	Without a wide-conversion lens	With a wide-conversion lens
TRV30/TRV40/TRV70	A1	A2
TR44/TR54/TR64/TR74 TR78/TR84/TR88/TR94 TR98/TR99/TR514/TR614 TR714/TR814	A3	

Video camera recorder CCD-	Position of the mounting screw plate on the adaptor	
	Without a wide-conversion lens	With a wide-conversion lens
TR200/TR300/TR500	B1	B3
TRV11/TRV21	B2	B5
TR3000	B3	B6
TR710/TR910	B4	B6
TRV41/TRV81 TR2300/TR3300	B4	B7

A, B —— adaptor to be used.
1, 2, 3... —— corresponding number on the adaptor.

Note

When you attach a wide conversion lens to the CCD-TRV11/TRV21/TRV41/TRV81 video camera recorders, you cannot attach the viewfinder adaptor.

AEP model

Video camera recorder CCD-	Position of the mounting screw plate on the adaptor	
	Without a wide-conversion lens	With a wide-conversion lens
TRV30/TRV40/TRV70 TRV30E/TRV40E TRV60E/TRV70E TRV30PK	A1	A2
TR330/TR420/TR440 TR490/TR590 TR330E/TR340E/TR410E TR420E/TR440E TR490E/TR510E/TR520E/ TR590E TR330BR/TR330PK/ TR420PK/TR440PK/ TR490PK/TR590PK	A3	

Video camera recorder CCD-	Position of the mounting screw plate on the adaptor	
	Without a wide-conversion lens	With a wide-conversion lens
TR1/TR3/TR8 TR1E/TR3E/TR8E TR18E	B1	B3
TRV11/TRV21 TRV11E/TRV21E/TRV21PK	B2	B5
TR3000/TR3000E	B3	B6
TR610E/TR710E TR760E/TR810E TR910/TR910E	B4	B6
TR2200E/TR2300E TR3300/TR3300E TRV31/TRV41 TRV51/TRV91 TRV31E/TRV41E TRV51E/TRV61E TRV81E/TRV91E	B4	B7

A, B —— adaptor to be used.
1, 2, 3... —— corresponding number on the adaptor.

Note

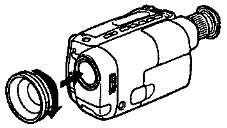
When you attach a wide conversion lens to the CCD-TR2200E/TRV11/TRV11E/TRV21/TRV21E/TRV21PK/TRV31/TRV31E/TRV41/TRV41E/TRV51/TRV51E/TRV61E/TRV81E/TRV91/TRV91E video camera recorders, you cannot attach the viewfinder adaptor.

Attaching the video camera recorder to the marine pack

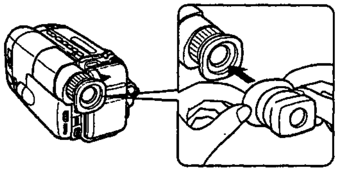
1 **Remove the lens cap, shoulder strap, filter, etc., from the video camera recorder.**

2 **Attach a charged battery pack and insert a video cassette.**

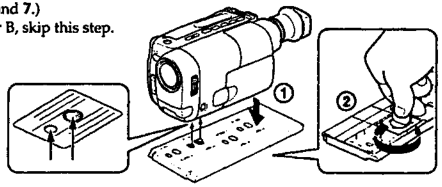
3 **Attach the wide conversion lens (not supplied).**
By attaching the wide conversion lens, the shooting coverage becomes wider, although the subject is shot smaller.



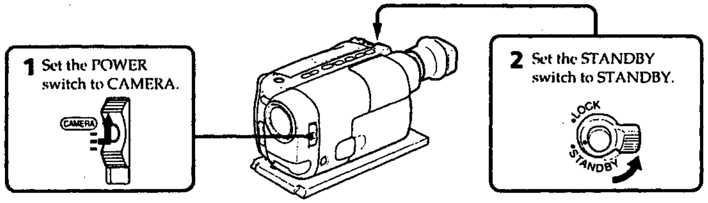
4 **Attach the Viewfinder adaptor.**



5 **When using the adaptor A, attach the adaptor to the video camera recorder.**
Check that the position of the mounting screw plate is correct. (See pages 6 and 7.)
When using the adaptor B, skip this step.



6 **Adjust the video camera recorder.**
Refer to the operation manual of your video camera recorder.



1 Set the POWER switch to CAMERA.

2 Set the STANDBY switch to STANDBY.

The following adjustments are needed when your video camera recorder has the corresponding function.
Refer to the operation manual of the video camera recorder for details.

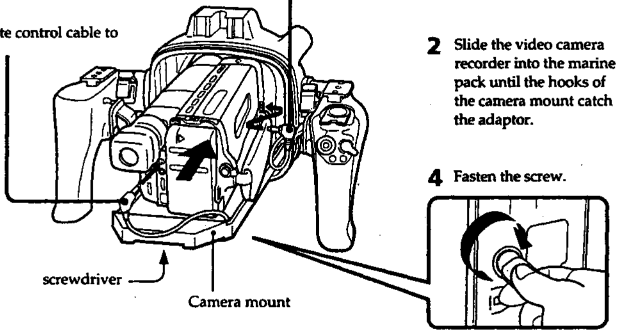
White balance	Normally set to ☀ (outdoor). Set to -☼- (indoor) for night diving.
Shutter speed	Set where no indicator appears.
Program AE	Set where no indicator appears.
Brightness	Turn off the indicator.

On some video camera recorder models, you cannot adjust the focus with the button on the marine pack. Set the focus to auto focus mode (see page 2).

(continued)

7 **Attach the video camera recorder to the marine pack.**
Check the position of the adaptor. (See pages 6 and 7.)

When using the adaptor A



1 Connect the microphone cable to MIC. (The sound is recorded in monaural.)

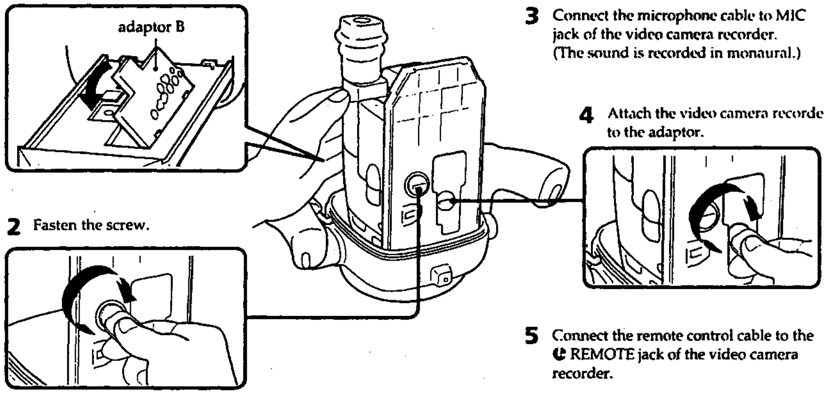
2 Slide the video camera recorder into the marine pack until the hooks of the camera mount catch the adaptor.

3 Connect the remote control cable to ⅽ REMOTE.

4 Fasten the screw.

When using the adaptor B

1 Aligh the right side of the adaptor with the hooks of the camera mount, then push down the adaptor.



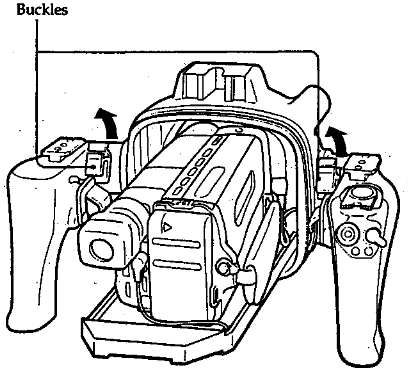
2 Fasten the screw.

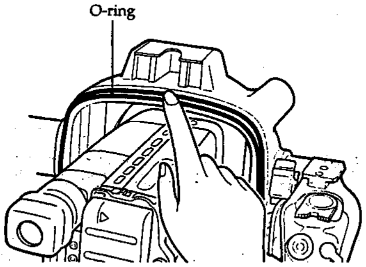
3 Connect the microphone cable to MIC jack of the video camera recorder. (The sound is recorded in monaural.)

4 Attach the video camera recorder to the adaptor.

5 Connect the remote control cable to the ⅽ REMOTE jack of the video camera recorder.

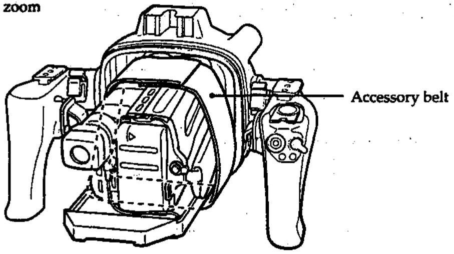
8 **Raise the buckles until they stop.**





Check the O-ring and grease it slightly.

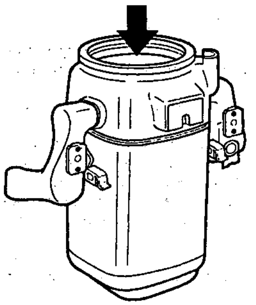
9 **Fasten the video camera recorder with the accessory belt.**
When you fasten the video camera recorder with accessory belt, take care not to touch the zoom button.



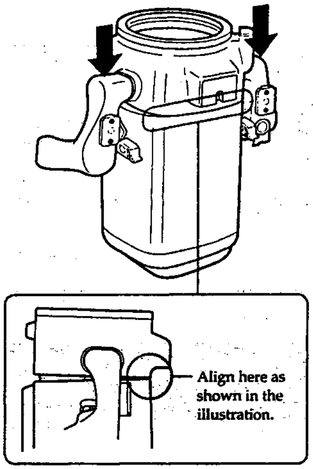
(continued)

10 **Attach the front shell to the rear shell.**

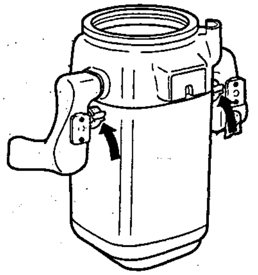
1 Put the front shell on the rear shell.



2 Press the top of both grips strongly.



3 Lower both buckles at the same time until they are locked. You will hear a click.

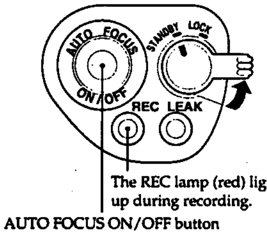


Now you are ready for underwater recording.

Set the STANDBY/LOCK switch of the marine pack to LOCK.
If you set it to STANDBY, the battery may be used up before recording.

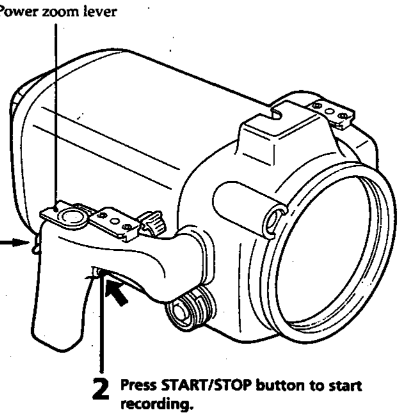
Recording

1 **Set the STANDBY/LOCK switch to STANDBY.**


AUTO FOCUS
ON/OFF
STANDBY
LOCK
REC
LEAK

The REC lamp (red) lights up during recording.

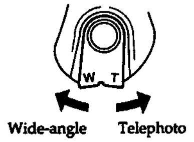
AUTO FOCUS ON/OFF button


Power zoom lever

2 **Press START/STOP button to start recording.**

To zoom

Slide the power zoom lever towards T for telephoto (subject appears closer) or W for wide-angle (subject appears farther away). The zooming speed can be changed on some video camera recorder models from a slow speed to faster by sliding the zooming lever a little more.


W
T
Wide-angle
Telephoto

When you set the power zoom lever to the full wide-angle position (macro), specks or bubbles on the front glass may come into focus. In this case, slide the power zoom lever a little towards T and return towards W.

To keep a subject in focus

After you focus on a subject, press the AUTO FOCUS ON/OFF button to set the video camera recorder to manual focus mode.
Even if fish swim between the video camera recorder and the subject, you can still keep the subject in focus.

Note
On some video camera recorder models, the AUTO FOCUS ON/OFF button is not operative.
Set the video camera recorder to auto focus mode (see page 2).

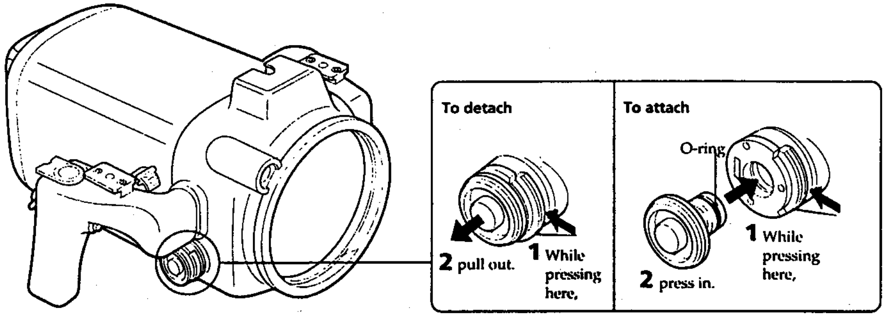
To stop recording

Press the START/STOP button.

To attach/detach the lid of the video cable connector

A video cable connector is provided so that video equipment can be connected to the marine pack in the future.

When you reattach the lid, grease the O-ring of the lid before inserting it into the connector.


To detach
2 pull out.
1 While pressing here,
To attach
O-ring
1 While pressing here,
2 press in.

Note

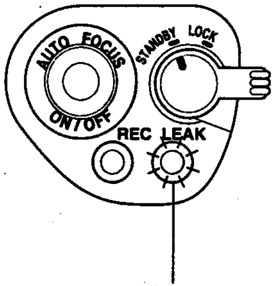
Do not remove the lid underwater.

When the LEAK lamp flashes

If water happens to leak in, the LEAK lamp (yellow) flashes.

In such a case, remove the marine pack from the water as soon as possible, keeping it horizontal. Be sure to surface following the safety rules for diving.
Dry the marine pack with a soft cloth and then open it.
To switch off the lamp, disconnect the remote control cable.
Check the cause of the leak.

If the video camera recorder is wet, take it to the nearest Sony dealer immediately.


AUTO FOCUS
ON/OFF
STANDBY
LOCK
REC
LEAK
LEAK lamp (yellow)

Removing the video camera recorder

Before opening the marine pack, rinse it with fresh water and dry with a soft cloth.

Note

When you open the marine pack, follow this procedure to prevent the video camera recorder from getting wet.

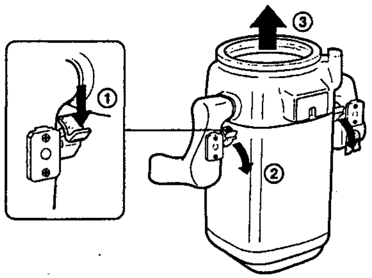
- Dry the marine pack well.
- Wipe off any water between the front and rear shells with a towel.
- Make sure you are dry. Take care that no water drips from your wet suit.

1 **Remove the accessories.**

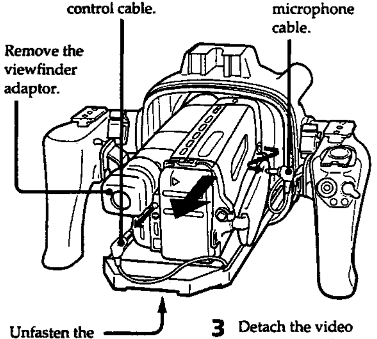
2 **Open the marine pack.**

1 Before opening the marine pack, rinse it with fresh water and dry with a soft cloth.

2 Unfasten both buckles and remove the front shell.



3 **Take the video camera recorder out of the front shell.**



1 Disconnect the remote control cable.

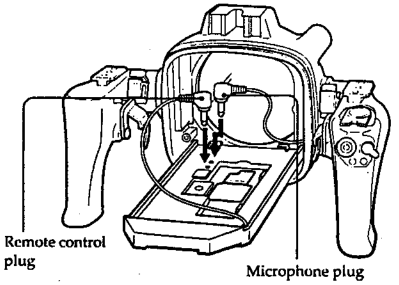
2 Unfasten the screw.

3 Detach the video camera recorder.

4 Disconnect the microphone cable.

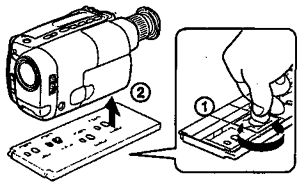
5 Remove the viewfinder adaptor.

4 **Insert the remote control plug and the microphone plug where they were.**

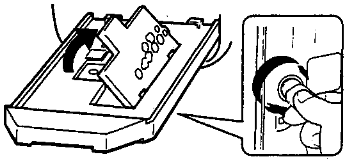


5 **Remove the adaptor.**

adaptor A



adaptor B



Underwater recording

Recording underwater is different from recording on land because it is affected by the clarity and depth of the water and the light conditions. The following are hints for good recording underwater.

Color characteristics underwater

Water absorbs light, especially red light, so that objects in deep water are seen as bluish. The color of objects is affected by the clarity of the water.

Best time for recording

The best recording time is from 10:00 a.m. to 2:00 p.m. When the sun is high in the sky, optimum results can be obtained.

Subject size underwater

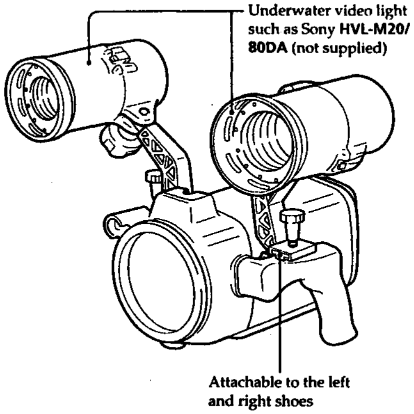
Since the refractive index underwater is higher than that in air, an object appears 1/4 more closer, and therefore larger. This phenomenon affects the lens on the video camera recorder as well as the human eye. Using a **wide-conversion lens** (not supplied) is recommended.

Camera work in slow and stable motion

When recording, keep your body stable.
An unstable shot will be magnified on the TV screen. Move the video camera recording as slowly as possible. As most of the object underwater move, you can record a good programme without moving the video camera recorder.

Underwater video light

In deep water or under rocks where direct sunlight does not reach, recording with an underwater video light is recommended.
To record at night, use a powerful underwater video light.

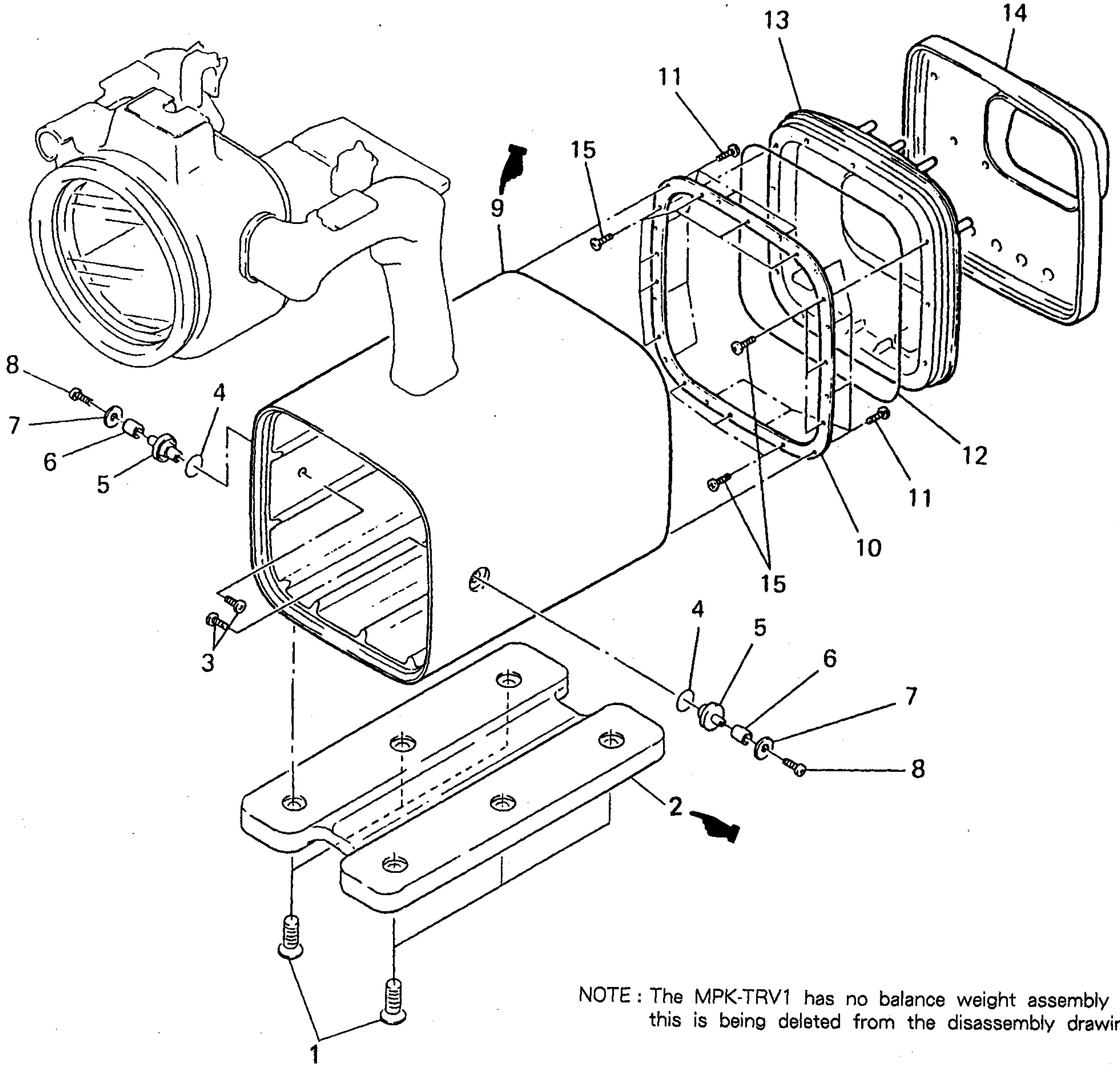

Underwater video light such as Sony **HVL-M20/80DA** (not supplied)
Attachable to the left and right shoes

SECTION 3
EXPLODED VIEWS

NOTE :
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " ∗ "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

☛ : Differences portion

3-1. MAIN SECTION-1 (Service manual page 17)

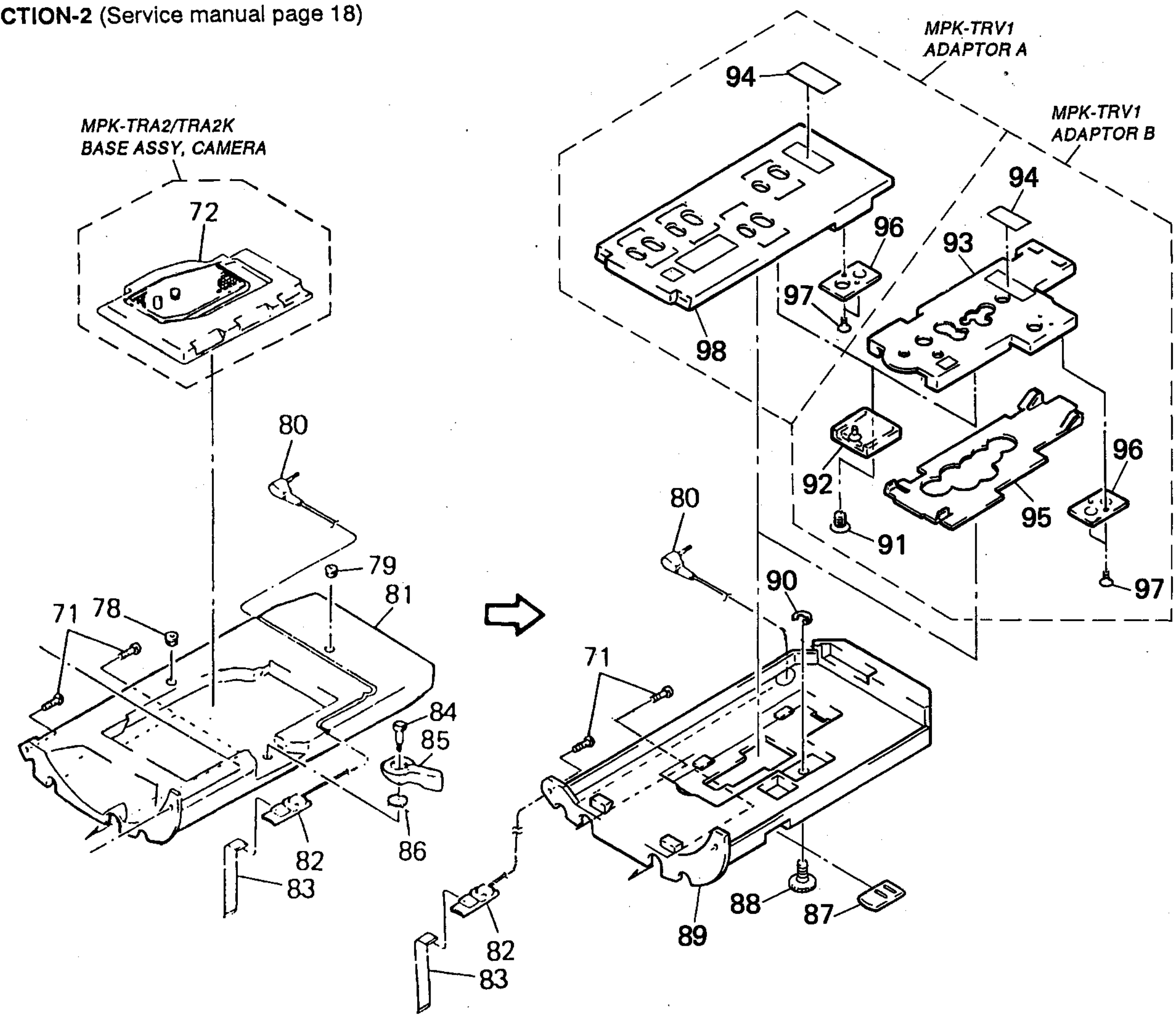


NOTE : The MPK-TRV1 has no balance weight assembly so this is being deleted from the disassembly drawing.

Ref. No.	Part No.	Description	Remark
1	3-950-861-01	SCREW (M4X6)	
∗ 2	3-970-239-01	WEIGHT	
3	3-951-373-01	SCREW (M5X6), PLUS (BV)	
4	3-950-858-01	RING (P-9), O	
5	3-950-859-01	PIN, LOCK	
6	3-952-626-01	COLLAR, LOCK PIN	
7	3-952-627-01	WASHER	
8	3-952-629-01	SCREW (M3X5)	
∗ 9	3-970-240-01	PIPE, MIDWAY	
∗ 10	3-952-920-01	PLATE, FIXED, REAR COVER	
11	3-950-857-01	SCREW (M2X5)	
12	3-952-928-01	RING (GS-165), O	
13	3-952-917-01	COVER, REAR	
14	3-952-918-01	PROTECTOR, REAR	
15	2-115-925-01	SCREW (2) (M2X5), TAPPING	

☛ : **Differences portion**

3-2. MAIN SECTION-2 (Service manual page 18)


MPK-TRA2/TRA2K
BASE ASSY, CAMERA
MPK-TRV1
ADAPTOR A
MPK-TRV1
ADAPTOR B
72
80
79
81
71
78
84
85
86
82
83
94
96
93
97
98
92
91
95
90
87
88
89

Ref. No.	Part No.	Description	Remark
71	2-186-307-01	SCREW (M3X8)	
80	1-696-933-61	CORD, CONNECTION (LANC)	☛
* 82	1-646-724-11	LM-44 BOARD	
83	1-696-021-31	WIRE (LEAK SENSOR)	
87	3-953-086-01	BRACKET	☛
* 88	3-970-217-01	SCREW, CAMERA FITTING	☛
89	3-970-238-01	BASE, MAIN	☛
90	2-391-512-00	RING (5), RETAINING, E TYPE	☛
91	3-960-767-01	SCREW, CAMERA FITTING	☛
92	3-960-030-02	BASE, SLIDE	☛
93	3-970-235-01	BASE (B)	☛
94	3-971-661-01	SHEET, PROTECTION A	☛
95	3-970-236-01	COVER, BASE	☛
96	2-115-831-01	SCREW	☛
97	3-971-597-01	TAPPING (2 2.6X6), +K	☛
98	3-970-233-01	BASE (A)	☛

ELECTRICAL PARTS LIST
(Service manual page 21)

Ref. No.	Part No.	Description	Remark
		ACCESSORIES & PACKING MATERIALS ******************************	
	2-115-921-01	GREASE	
	3-856-171-11	MANUAL, INSTRUCTION (ENGLISH, FRENCH, SPANISH, PORTUGUESE) (AEP)	
	3-856-171-21	MANUAL, INSTRUCTION (ENGLISH, FRENCH) (US, Canadian)	
	3-856-171-31	MANUAL, INSTRUCTION (GERMAN, DUTCH, SWEDISH, ITALIAN) (AEP)	
	3-856-171-41	MANUAL, INSTRUCTION (ARABIC, RUSSIAN, CHINESE) (AEP)	
	3-952-928-01	RING (GS-165), O	
*	3-953-232-01	CUSHION (UPPER)	
*	3-953-233-01	CUSHION (LOWER)	
*	3-964-841-01	BELT, CAMERA FIXED	

Sony Corporation
Consumer A&V Products Company
Personal A&V Products Div.

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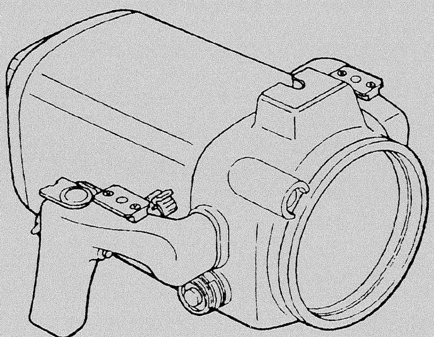
Published by Personal A&V Products Div.
Quality Engineering Dept.

MPK-TRA2/TRA2K

SERVICE MANUAL

US Model
Canadian Model
AEP Model
UK Model
MPK-TRA2

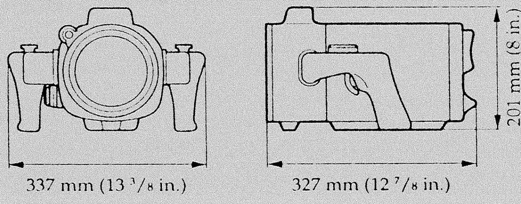
AEP Model
UK Model
MPK-TRA2K



Handycam

SPECIFICATIONS

Compatible video camera recorder	See page **3**.
Material	Aluminum alloy, glass, plastic
Waterproofing	O-ring, 2 buckles
Usable depth	Up to 75 meters (246 feet)
Underwater microphone	Condenser microphone (monaural)
Controllable function	Power on/off, recording start/stop, auto focus on/off, power zooming
Dimensions	



Mass	Approx. 8 kg (17 lb 10 oz)
Supplied accessories	**MPK-TRA2:** Adaptor (1) O-rings (2) Grease (1) **MPK-TRA2K:** Carrying case (1) Shoulder strap (1) Keys (2) Adaptor (1) O-rings (2) Grease (1)
Recommended accessories	Underwater video light **HVL-M20, HVL-80DA** Maintenance kit **ACC-810M** Color filter **VF-M150**

Design and specifications are subject to change without notice.

Features

The **MPK-TRA2/TRA2K** marine pack allows the following 8 mm video camera recorders to be used underwater.

CCD-TR1/TR1E
CCD-TR3/TR3E
CCD-TR8/TR8E
CCD-TR45/TR45E
CCD-TR55/TR55E
CCD-TR75/TR75E
CCD-TR105/TR105E
CCD-TR202E
CCD-TR212
CCD-TR303/TR303E
CCD-TR305/TR305E
CCD-TR323/TR323E
CCD-TR333/TR333E
CCD-TR350E
CCD-TR353/TR353E
CCD-TR450E
CCD-TR470E
CCD-TR530E
CCD-TR550/TR550E
CCD-TR606E
CCD-TR650E
CCD-TR705/TR705E
CCD-TR750/TR750E
CCD-TR805/TR805E
CCD-TR2000/TR2000E
CCD-FX200E
CCD-FX300/FX300E
CCD-FX400/FX400E
CCD-FX500/FX500E
CCD-FX700/FX700E

(The illustrations are of the **CCD-TR805E**.)

- **Recording at a depth of 75 meters (246 feet) is possible.**
- **The following operations can be performed underwater.**
  Power on/off
  Auto focusing on/off (Except for **CCD-FX300/FX300E/FX400/FX400E**)
  Recording start/stop
  Power zooming

MICROFILM

HANDYCAM MARINE PACK

SONY®

SECTION 1
GENERAL

This section is extracted from instruction manual.

Precautions

On the video camera recorder

Take care not to expose the equipment to salty air nor to drip water on the equipment.

- Do not open the marine pack on the sea or at the seaside. Preparations such as installing and checking the equipment should be made in a place with low humidity and no salty air.
- When a video camera recorder is to be used by the sea for a long time, we recommend that they are checked periodically by a Sony service facility.
- If the equipment becomes wet, take it immediately to the nearest Sony service facility for preventive maintenance.

On power source for the video camera recorder

Use the battery pack **NP-77H**, **NP-77HD**, or **NP-S88**. For the **CCD-TR1/TR1E/TR3/TR3E/TR8/TR8E**, use the **NP-500**.

On the marine pack

- If you put the marine pack in the water after you opened and jointed the front and rear shells in a place with high temperature and high humidity, moisture condensation may occur, causing the glass to fog up.
- The waterproof integrity of the marine pack is maintained by the O-ring, and the groove and surface where it touches. Be especially careful not to damage or deform that area.
- Do not leave the marine pack under direct sunlight for a long period of time, otherwise the temperature in the marine pack may rise and the equipment in the marine pack may be damaged.
- If you cannot avoid leaving the marine pack under direct sunlight, be sure to cover the marine pack with a towel or other protection.
- Do not throw the marine pack into the water. Lower it gently into the water.

On recording underwater

- Check that the equipment operates correctly and there is no water leak at a depth of about one meter (3 feet) before you dive deeper.
- Be sure to follow the safety rules for diving such as diving period and depth.
- Remove the bubbles from outside of the front glass.

Sony does not accept liability for damage to the video camera recorder, battery, etc. in the marine pack and for *the cost of recording if water leak occurs caused by* incorrect operation.

On maintenance

After recording in the sea, submerge the marine pack with the buckles tightly fastened in fresh water for a while to remove the sea water. Then rinse it with fresh water and dry it with a soft cloth.

- Every time after you use the marine pack and the video camera recorder underwater, clean the video camera recorder and inside of the marine pack with a dry soft cloth. Do not use any type of solvent, such as alcohol or benzine for cleaning, as this might damage the finish.
- When you store the marine pack, grease the O-ring, put it in the groove correctly. Joint the front and rear shells and place it in a cool place without fastening the buckles. Avoid storing the marine pack in a hot or very cold place, in a place subject to direct sunlight or excessive dust, or together with naphthalene or camphor. This will damage the marine pack.

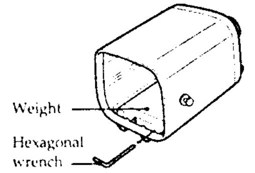
On transportation

- To transport the marine pack, be sure to remove the video camera recorder from the marine pack.
- To transport the marine pack by air or by car, use the supplied carrying case.

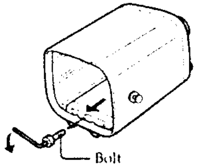
To remove the weight

You can remove the weight in the rear shell.

1 Pull out the hexagonal wrench.



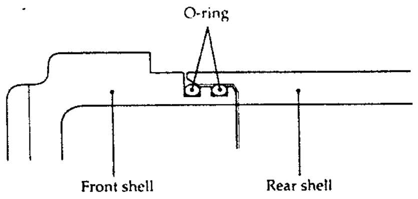
2 Remove the bolt using the hexagonal wrench.



When you use the marine pack, replace the weight as it was.

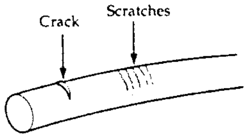
Notes on the o-ring

The O-ring assures the waterproof function of the marine pack. To maintain waterproof integrity, use it correctly. Incorrect handling may cause water to leak in.



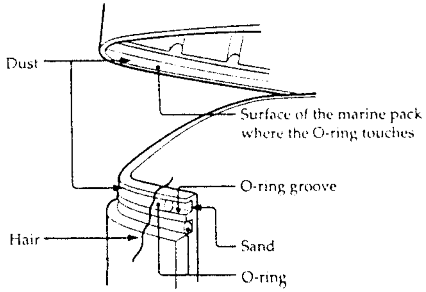
Check that there are no scratches or cracks.

Scratches or cracks on the O-ring may cause water to leak in. If there are any, replace the damaged O-ring with a new one. Do not remove the O-ring from the groove with a metal tool or a tool with a sharp point.



Remove any dust, sand or hair from the O-ring.

Check there is no dust, sand or hair on the O-ring, or in the groove or on the surface of the marine pack where it touches. If there is, remove them completely, or the O-ring and the surface of the marine pack may be damaged and water may leak in.

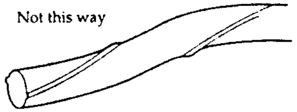


Grease the O-ring

The grease protects the O-ring from wear.
Check that there are no cracks or dust on the O-ring, then grease it using a finger. During greasing, recheck that there are no cracks or dust.
Never use cloth or paper for greasing because the fibers may cling.
Do not use any type of grease other then the supplied one, or it may damage the O-ring.

Do not twist the O-ring.

Put the O-ring in the groove evenly. Never twist it.



Do not trap the O-ring with the marine pack

When jointing the front and rear shells, take care not to trap the O-ring between the front and rear shells. If this happens, not only will the O-ring be damaged, but also water may leak in.

Storage

Put the supplied spare O-rings in the original carton and store it in a cool place.

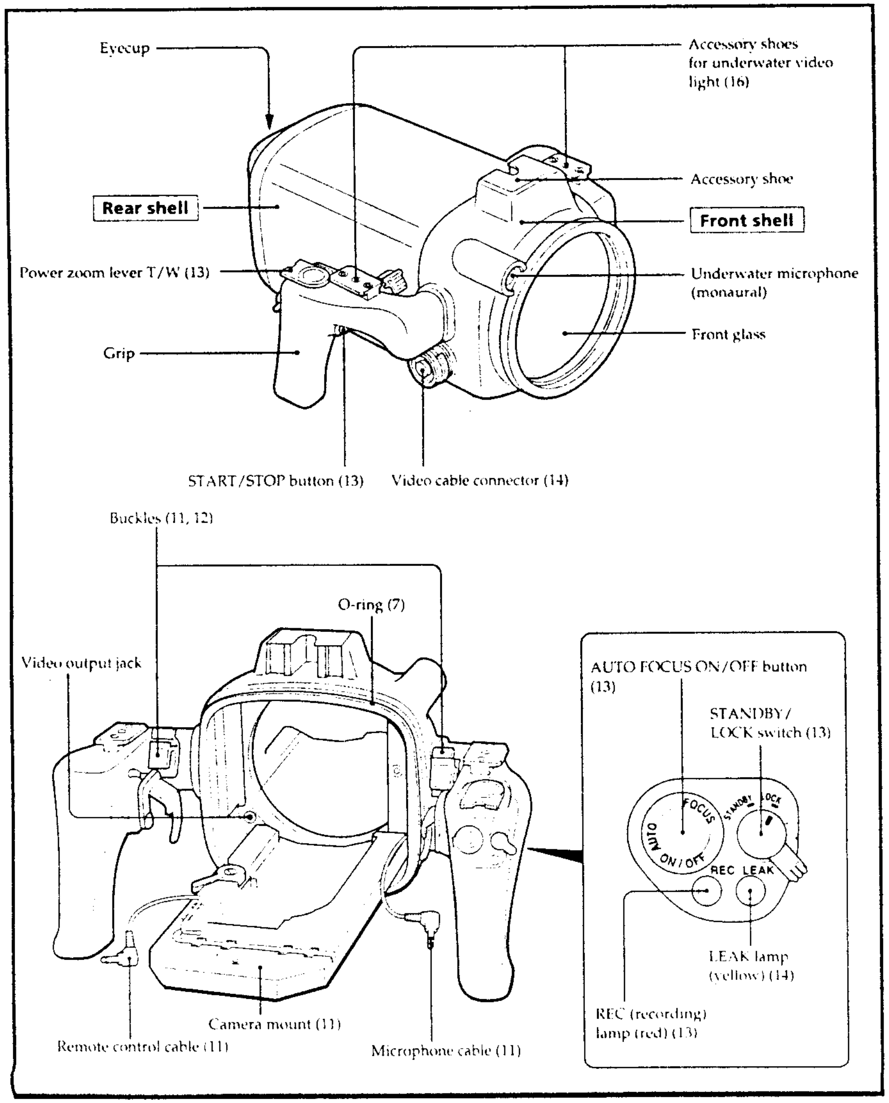
- Do not expose the O-ring to direct sunlight.
- Do not place a heavy object on the O-ring.
- Do not fold the O-ring.

Useful life of the O-ring.

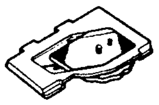
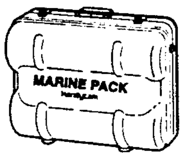
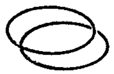
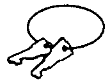
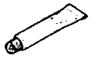
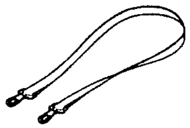
It depends upon the maintenance and the length of use, but we recommend changing it every one or two years. Use the Sony **ACC-810M** marine pack maintenance kit (not supplied) to replace.

Labeling the parts and controls

- For the use of each part or control, see the pages indicated in parenthesis.


Eyecup
Accessory shoes for underwater video light (16)
Rear shell
Accessory shoe
Front shell
Power zoom lever T/W (13)
Underwater microphone (monaural)
Front glass
Grip
START/STOP button (13)
Video cable connector (14)
Buckles (11, 12)
O-ring (7)
Video output jack
AUTO FOCUS ON/OFF button (13)
STANDBY/LOCK switch (13)
FOCUS
AUTO
ON/OFF
STANDBY
LOCK
REC
LEAK
LEAK lamp (yellow) (14)
REC (recording) lamp (red) (13)
Camera mount (11)
Remote control cable (11)
Microphone cable (11)

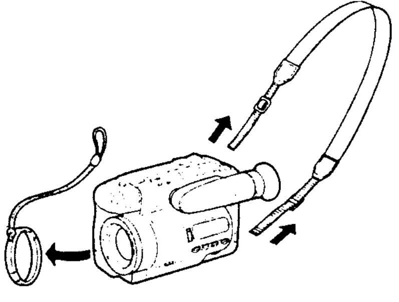
Supplied accessories

	(Supplied for MPK-TRA2K only)
 Adaptor (1)	 Carrying case (1)
 O-rings (2)	 Keys (2)
 Grease (1)	 Shoulder strap (1)

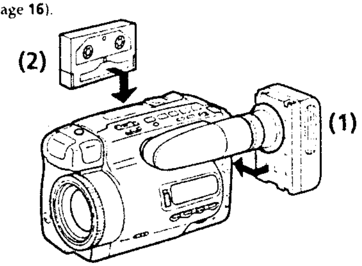
MARINE PACK

Attaching the video camera recorder to the marine pack

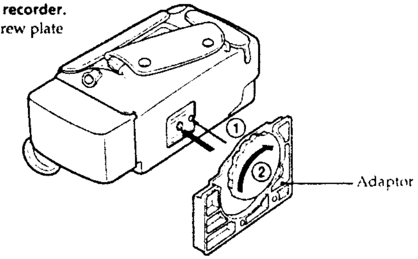
1 **Remove the lens cap, shoulder strap, filter, etc., from the video camera recorder.**



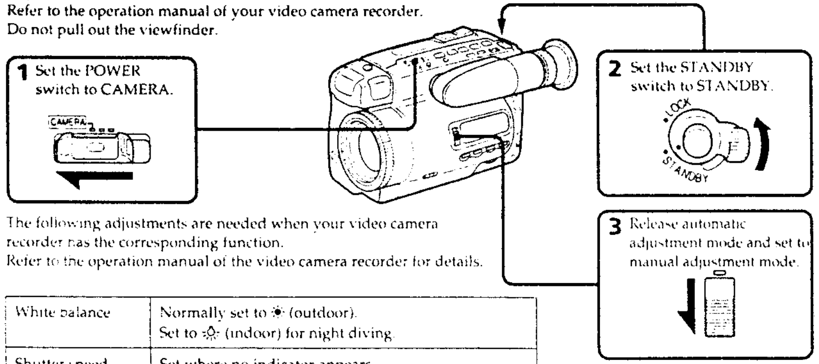
2 **Attach a charged battery pack (1) and a video cassette (2).**
If you use a wide conversion lens (not supplied), attach it as well (except for **CCD-FX** models, see page **16**).



3 **Attach the adaptor to the video camera recorder.**
Check that the position of the mounting screw plate is correct. (See pages **8** and **9**.)



4 **Adjust the video camera recorder.**
Refer to the operation manual of your video camera recorder.
Do not pull out the viewfinder.



1 Set the POWER switch to CAMERA.

2 Set the STANDBY switch to STANDBY.

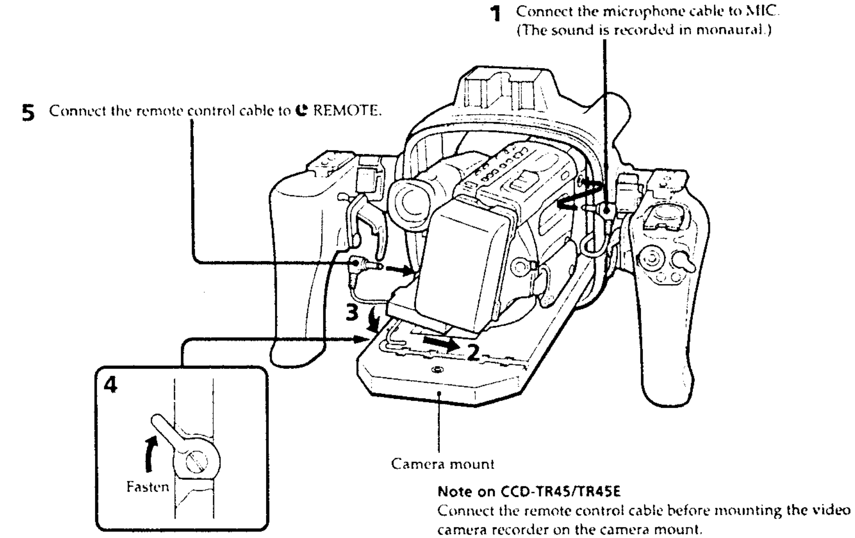
3 Release automatic adjustment mode and set to manual adjustment mode.

The following adjustments are needed when your video camera recorder has the corresponding function.
Refer to the operation manual of the video camera recorder for details.

White balance	Normally set to ☀ (outdoor). Set to ☼ (indoor) for night diving.
Shutter speed	Set where no indicator appears.
Program AE	Set where no indicator appears.
Brightness	Turn off the indicator.

Note on CCD-FX300/FX300E/FX400/FX400E
Set the focus to auto focus mode.

5 **Attach the video camera recorder to the marine pack.**
Chaeck the position of the adaptor. (See pages **8** and **9**.)

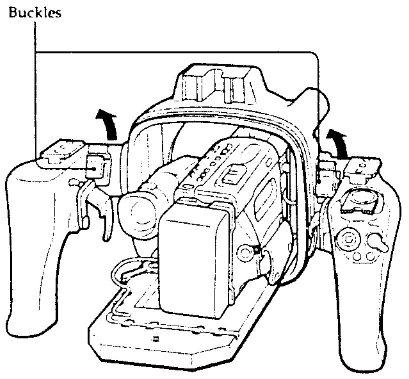


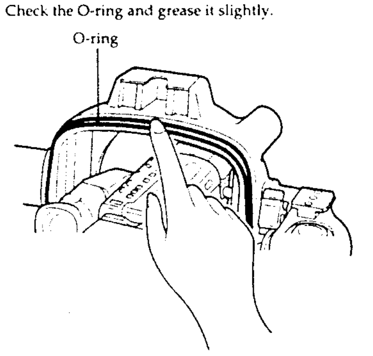
1 Connect the microphone cable to MIC.
(The sound is recorded in monaural.)

5 Connect the remote control cable to ⟲ REMOTE.

Note on CCD-TR45/TR45E
Connect the remote control cable before mounting the video camera recorder on the camera mount.

6 **Raise the buckles until they stop.**



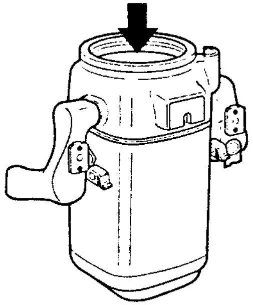


Check the O-ring and grease it slightly.

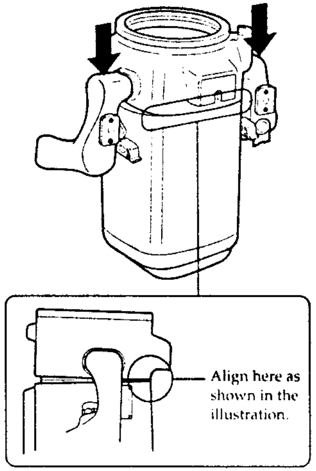
(To be continued)

7 **Attach the front shell to the rear shell.**

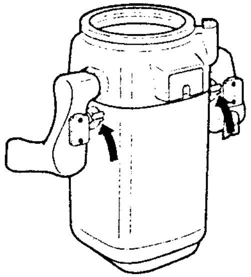
1 Put the front shell on the rear shell.



2 Press the top of both grips strongly.


Align here as shown in the illustration.

3 Lower both buckles at the same time until they are locked. You will hear a click.

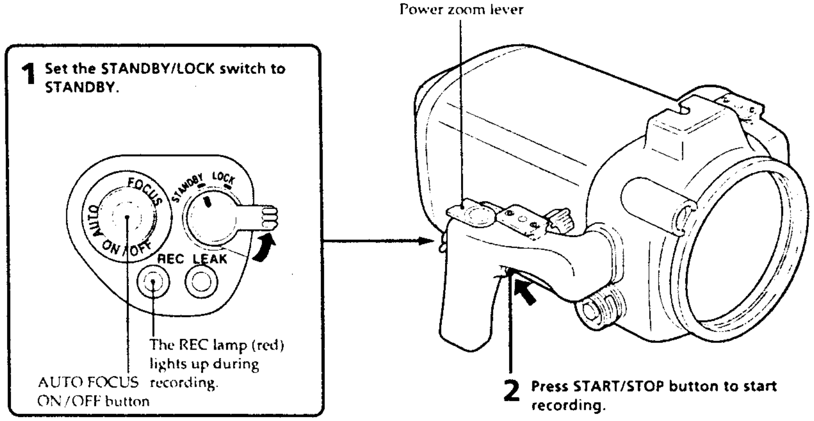


Now you are ready for underwater recording.

Set the STANDBY/LOCK switch of the marine pack to LOCK.
If you set it to STANDBY, the battery may be used up before recording.

Recording

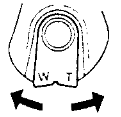
1 **Set the STANDBY/LOCK switch to STANDBY.**


Power zoom lever
FOCUS
AUTO
ON/OFF
STANDBY
LOCK
REC
LEAK
The REC lamp (red) lights up during recording.
AUTO FOCUS ON/OFF button

2 **Press START/STOP button to start recording.**

To zoom

Slide the power zoom lever towards T for telephoto (subject appears closer) or W for wide-angle (subject appears farther away). The zooming speed can be changed for some models of the video camera recorder from a slow speed to faster by sliding the zooming lever a little to more.


W
T
Wide-angle
Telephoto

When you set the power zoom lever to the full wide-angle position (macro), specks or bubbles on the front glass may come into focus. In this case, slide the power zoom lever a little towards T and return towards W.

To keep a subject in focus

After you focus on a subject, press the AUTO FOCUS ON/OFF button to set the video camera recorder to manual focus mode.
Even if fish swim between the video camera recorder and the subject, you can still keep the subject in focus.

Note on CCD-FX300/FX300E/FX400/FX400E
The AUTO FOCUS ON/OFF button is not operative for these models.
Set the video camera recorder to auto focus mode.

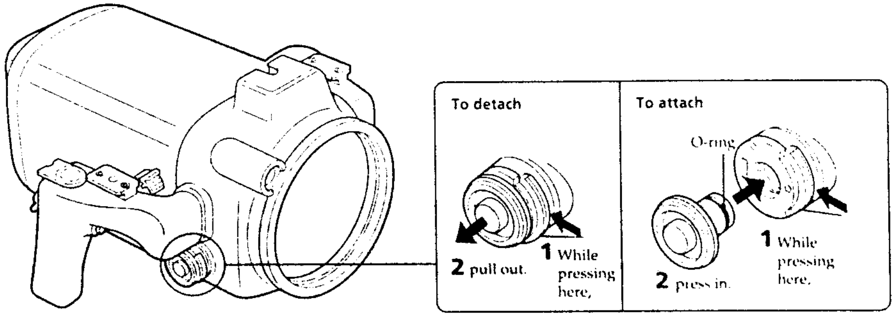
To stop recording

Press the START/STOP button

To attach/detach the lid of the video cable connector

A video cable connector is provided so that video equipment can be connected to the marine pack in the future.

When you reattach the lid, grease the O-ring of the lid before inserting it into the connector.


To detach
1 While pressing here,
2 pull out.
To attach
O-ring
1 While pressing here.
2 press in.

Note

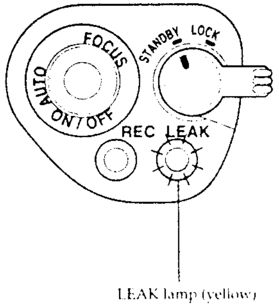
Do not detach the lid underwater.

When the LEAK lamp flashes

If water happens to leak in, the LEAK lamp (yellow) flashes.

In such a case, remove the marine pack from the water as soon as possible, keeping it horizontal. Be sure to surface following the safety rules for diving.
Dry the marine pack with a soft cloth and then open it.
To switch off the lamp, disconnect the remote control cable.
Check the cause of the leak.

If the video camera recorder is wet, take it to the nearest Sony service facility immediately.


FOCUS
AUTO
ON/OFF
STANDBY
LOCK
REC
LEAK
LEAK lamp (yellow)

Removing the video camera recorder

Before opening the marine pack, rinse it with fresh water and dry with a soft cloth.

Note

When you open the marine pack, take care the following points to prevent the video camera recorder from getting wet.

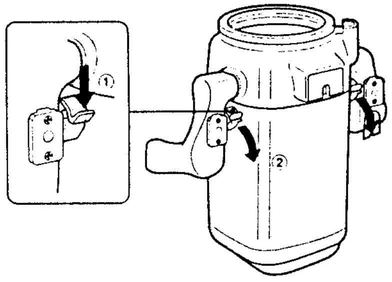
- Dry the marine pack well.
- Wipe off any water between the front and rear shells with a towel.
- Make sure you are dry. Take care that no water drops from your wet suit.

1 Remove the accessories.

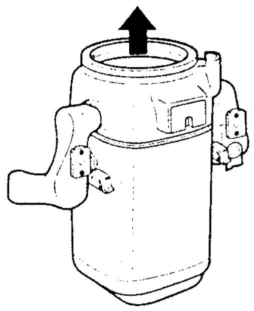
2 Open the marine pack.

1 Before opening the marine pack, rinse it with fresh water and dry with a soft cloth.

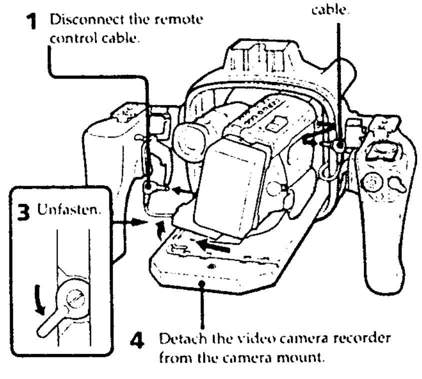
2 Unfasten the both buckles.



3 Remove the front shell.



3 Take the video camera recorder out of the front shell.



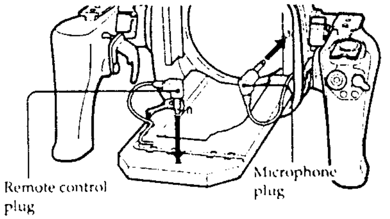
1 Disconnect the remote control cable.

2 Disconnect the microphone cable.

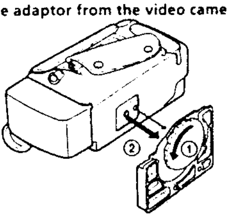
3 Unfasten.

4 Detach the video camera recorder from the camera mount.

4 Insert the remote control plug and the microphone plug where they were.


Remote control plug
Microphone plug

5 Remove the adaptor from the video camera recorder.



Underwater recording

Recording underwater is different from recording on land because it is affected by the clarity and depth of the water and the light conditions. The followings are hints for good recording underwater.

Color characteristics underwater

Water absorbs light, especially red light, so that objects in deep water are seen as bluish. The color of objects is affected by the clarity of the water.
To record in natural color, use the Sony **VF-M150** color filter (not supplied).

Best time for recording

The best recording time is from 10:00 a.m. to 2:00 p.m. When the sun is high in the sky, optimum results can be obtained.

Subject size underwater

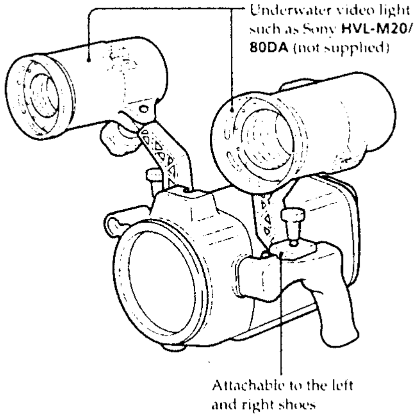
Since the refractive index underwater is higher than that in air, an object is visible by 1/4 more closely, and therefore larger. This phenomenon affects the lens on the video camera recorder as well as the human eye. Using a **wide-conversion lens** is recommended. (You cannot attach a wide conversion lens to a **CCD-FX** model to use it with this marine pack.)

Camera work in slow and stable motion

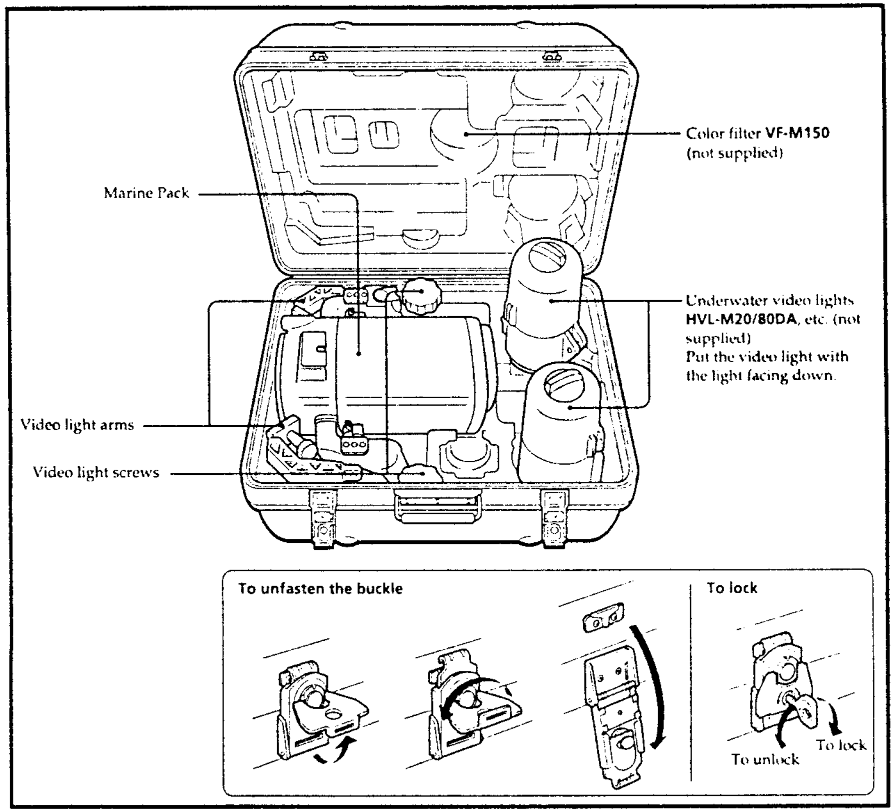
When recording, keep your body stable.
An unstable shot will be magnified on the TV screen. Move the video camera recording as slowly as possible. As most of the object underwater move, you can record a good program without moving the video camera recorder.

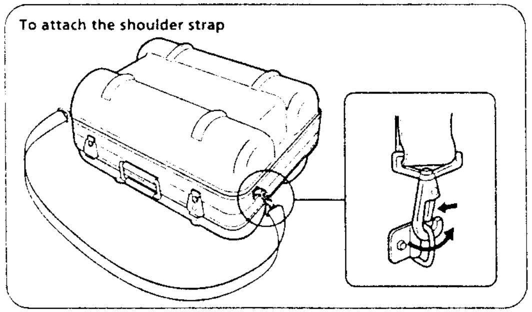
Underwater video light

In a deep water or under rocks where direct sunlight does not reach, recording with the underwater video light is recommended.
To record at night, use an additional powerful underwater video light.


Underwater video light such as Sony **HVL-M20/80DA** (not supplied)
Attachable to the left and right shoes

About the carrying case (supplied for MPK-TRA2K only)


Color filter **VF-M150** (not supplied)
Marine Pack
Underwater video lights **HVL-M20/80DA**, etc. (not supplied)
Put the video light with the light facing down.
Video light arms
Video light screws
To unfasten the buckle
To lock
To unlock
To lock


To attach the shoulder strap

Note

Take care not to drip water inside the case. Dry the equipment before you put them in the case. Do not use any type of solvent, such as alcohol or benzine for cleaning the case, as this might damage the finish.

1. Concerning Defects

Marine Pack defects are classified as the three following types.

1) **Operational defects**

This type mainly involves malfunctions caused by electrical circuit or parts defects. Repair is the same as for normal products.

2) **Damaged and missing parts**

Waterproofing is sometimes affected by the locations of defects and symptoms. Before making repairs, always use the check list to check the type of defect.

Note : Refer to pages 10 and 11 for the check list.

3) **Water leaks**

After the discovery of a defect or after making repairs, it is necessary to perform either a hydraulic pressure test or simple water leak test using a water tank.

2. Concerning Water Leaks

To ensure waterproofing, O-rings are used in the holes in the Marine Pack housing for openings, shafts, display windows and the front glass. Water leaks are possible in any of these locations but the conditions under which water leaks occur differ for the openings and the other parts.

1) **Water leaks at openings**

Openings are waterproofed using O-rings compressed by the force of the buckle spring.

Near the surface of the water, where little water pressure is applied to Marine Pack, the force of the buckle alone provides sufficient waterproofing. As the water pressure applied to Marine Pack increases at greater depths, however, the force applied to the O-rings increases due to the water pressure to increase the waterproofing.

Because of this, due to the type of waterproofing construction used, opening water leaks are more prone to occur in shallow water (approx. 2 meters) than in deep water.

Also, since there is a gap between the front and rear housings, sand and dirt tend to enter and adhere to the O-ring in shallow water. When the cover is opened, this sand and dirt can then enter under the O-ring and cause a water leak the next time Marine Pack is used.

This, most water leaks in the openings are the result of adhered dirt, sand, hair and other foreigh matter as well as O-ring and housing damage due to careless handing.

2) **Water leaks at other openings**

Parts where there are holes in the housing (shafts, display window, front and rear glass) are constructed with O-rings mechanically compressed by screws and nuts.

Due to the construction, these places cannot be reached with the hands : therefore, the waterproofing is more secure than that of the openings.

The causes of water leaks are damage of the parts compressing the O-rings, loosening of the screws and nuts fastening the parts and improper reassembly.

3. Water Leak Check Methods

After the discovery and repair of water leak, it is necessary to perform a hydraulic pressure test and water leak test using a water tank.

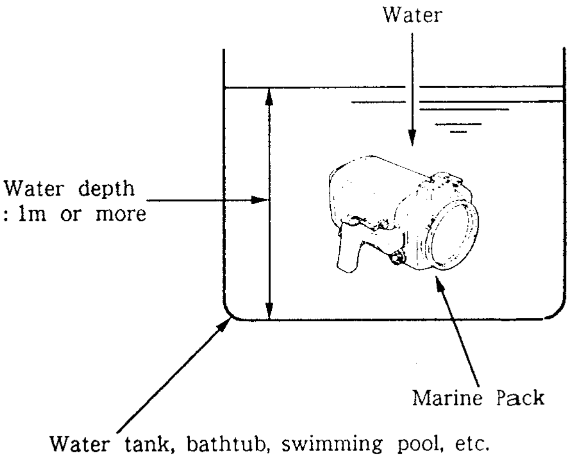
1) **Opening water leak check method**

As was mentioned above, due to the construction, water leaks in openings are more prone to occur in shallow water than in deep water. Consequently, a simple water leak test using a water tank is sufficient in many cases, without performing a hydraulic pressure test.

***Water leak test**

In this method, Marine Pack immersed in a tank filled with water and checked for water leaks.

Marine Pack should be left immersed in the water tank (or bathtub, swimming pool, etc.) for at least 15-20 minutes with the covers closed. The water depth should be at least 1 meter.



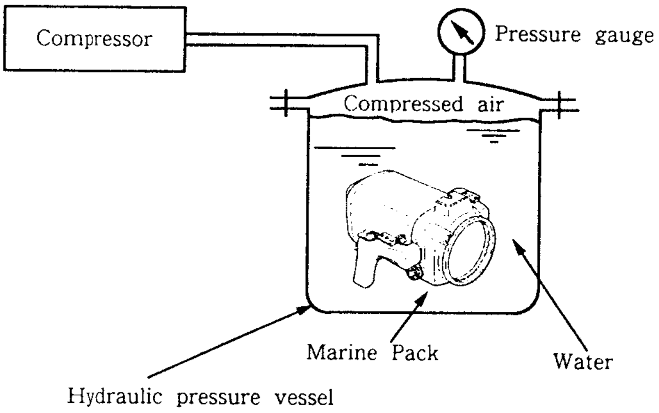
2) Water leak check methods for other waterproofed locations.

In addition to water leaks caused by damaged parts and loose screws, there are also water leaks at other waterproofed locations which cannot be detected with a water leak test : therefore, the hydraulic pressure test must be used.

****Hydraulic pressure test**

In this test, Marine Pack is immersed in a water tank called a hydraulic pressure vessel, pressure is applied using compressed air and checks are made for water leaks and the ability to withstand water pressure is tested.

Extreme pressure is applied to Marine Pack underwater. Water leaks may occur when this pressure is first applied. In such cases, the water leak check must be made using the hydraulic pressure test with a hydraulic pressure vessel.



4. Causes of Water Leaks (excluding parts damage)

Water leaks in openings

1) When the covers have been closed with sand, dirt and hair adhered to the O-rings, O-ring grooves, housing O-ring contact surface or waterproof packing.
2) When the cover is closed with an O-ring out of its groove or a cord is caught in the cover.
3) When an O-ring is damaged or cracked (aging).
4) When there is a long scratch which crosses the housing O-ring contact surface.
5) When a cover is not tightly closed due to a defective buckle.

- Water leaks at other waterproofed locations

6) When there are scratches on the surfaces of the parts which compress the O-rings.
7) When the Parts which compress are loose.
8) When tightening with sand, dirt and hair adhered to an O-ring or part which compresses the O-ring.
9) When an O-ring has not been installed.

Causes 1)-5) and 9) above can be discovered relatively easily using the water leak test described above.

5. Water Leak Repair Methods

- Relatively light scratches on O-ring contact surfaces can often by repaired by polishing.

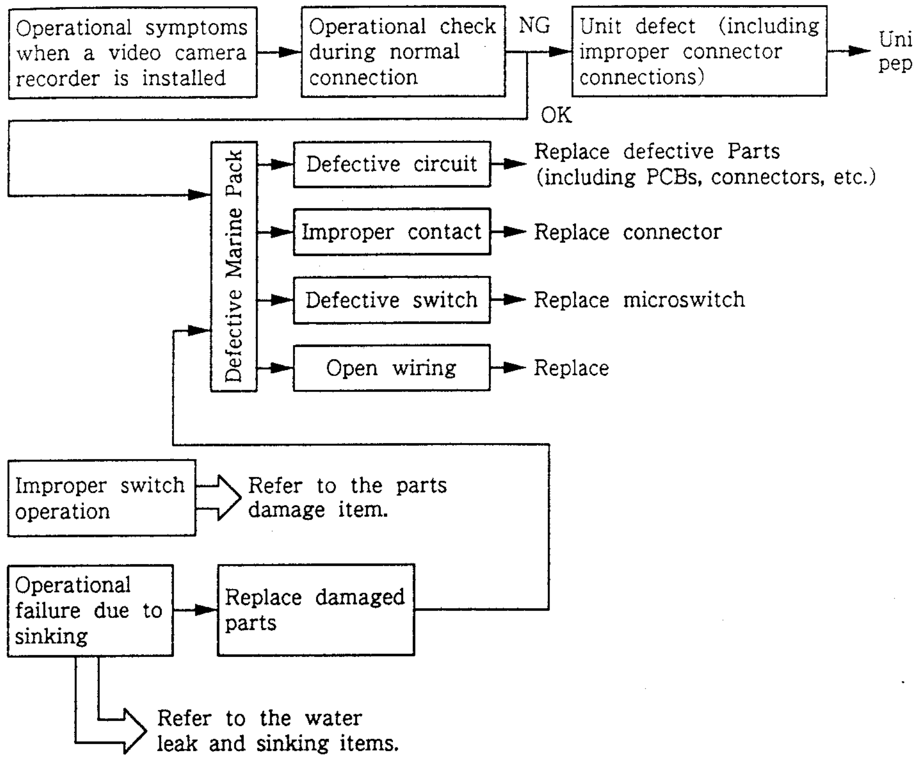
1) Only extermely light scratches can be repaired.
2) Use number 600-1000 waterproof sandpaper for repairs and apply water while polishing.
3) Polish the scratch area smoothly using care not to create local indentations.
4) Do not use putty to make repairs since such repairs will fail under water pressure.

- Checks and cautions

1) Make sure that there are no scratches on the housing O-ring contact surfaces.
2) Make sure that there are no scratches or cracks in the O-rings.
3) Always coat the O-rings with grease by hand and make sure that the O-rings are not twisted when installed.

6. Repair Location and Hydraulic Pressure Test

When a defect is discovered or a repair is made at a location related to the waterproofness of Marine Pack, the hydraulic pressure test must be performed.
Repairs at locations which require the hydraulic pressure test, and the hydraulic pressure test itself, are performed at the factory : therefore, always check the type of defect using the check list before making repairs.

Type of defect	Defect location and repair method	Hydraulic pressur test
Improper operation		Unnecessary

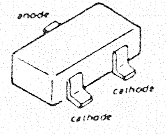
Operational symptoms when a video camera recorder is installed
Operational check during normal connection
NG
Unit defect (including improper connector connections)
Unit pepair
OK
Defective Marine Pack
Defective circuit
Replace defective Parts (including PCBs, connectors, etc.)
Improper contact
Replace connector
Defective switch
Replace microswitch
Open wiring
Replace
Improper switch operation
Refer to the parts damage item.
Operational failure due to sinking
Replace damaged parts
Refer to the water leak and sinking items.

Type of defect	Defect location/symptom			Repair method	Hydraulic pressure test
Parts damage	Housing related	Exterior part	Scratch	Replace part	Necessary
		Wateaproofing O-ring	Light damage damage	Polish using waterproof sandpaper	Necessary
			Heavy damage	Replace part	
		O-ring	Scratch, agin	Replace part (life : 2 years)	Unnecessary
		Buckle (including mounting screw)	Damage or coming off	Replace part (repair housing when screws are affected)	Unnecessary
		Underwater microphone	Damage	Replace part	Necessary
	Grip area	Deformation, damage	Light damage	Replace part	Unnecessary
			Heavy damage	Housing repair (overhaul mounting section)	Unnecessary
	Front glass section	Front glass	Damage	Replace part	Necessary
	Rear glass section	Eye cap	Damage, loss	Replace part	Unnecessary
		Rear glass	Damage	Replace part	Necessary
	(Switch related) REC START／STOP switch Power zoom switch (lever) STANDBY／LOCK switch (lever) AUTO FOCUS ON／OFF switch	Lever	Damage or coming off	Replace part	Necessary
		Switch	Deformation, scratch, damage or coming off	Replace part	Necessary
	Video camera recorder mounting base area	Camera mount	Damage	Replace part	Unnecessary
		Water leakage sensor box.	Damage	Replace part	Unnecessary
Sinking due to water leak	Determine cause using the hydraulic pressure test.			Repair the defect or replace the part.	Necessary

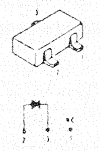
SECTION 2
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAM

2-1. SEMICONDUCTOR LEAD LAYOUTS

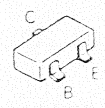
1SS181


anode
cathode
cathode

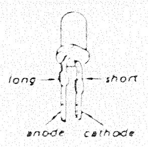
1SS184
RD9.1M-B2



DTC114EK
DTC115TK-146
DTC144EK



TLR123
TLY123


long
short
anode
cathode

- SEMICONDUCTOR LOCATION

IC1	J-8
IC2	J-10
IC3	J-15
D1	C-11
D2	C-6
D3	E-7
D4	C-10
D5	D-9
D6	C-8
D7	C-15
D8	E-6
D9	D-6
Q1	B-6
Q2	B-6
Q3	C-6
Q4	E-6
Q5	D-6
Q6	C-7
CN1	K-12
CN2	K-10
CN3	K-9

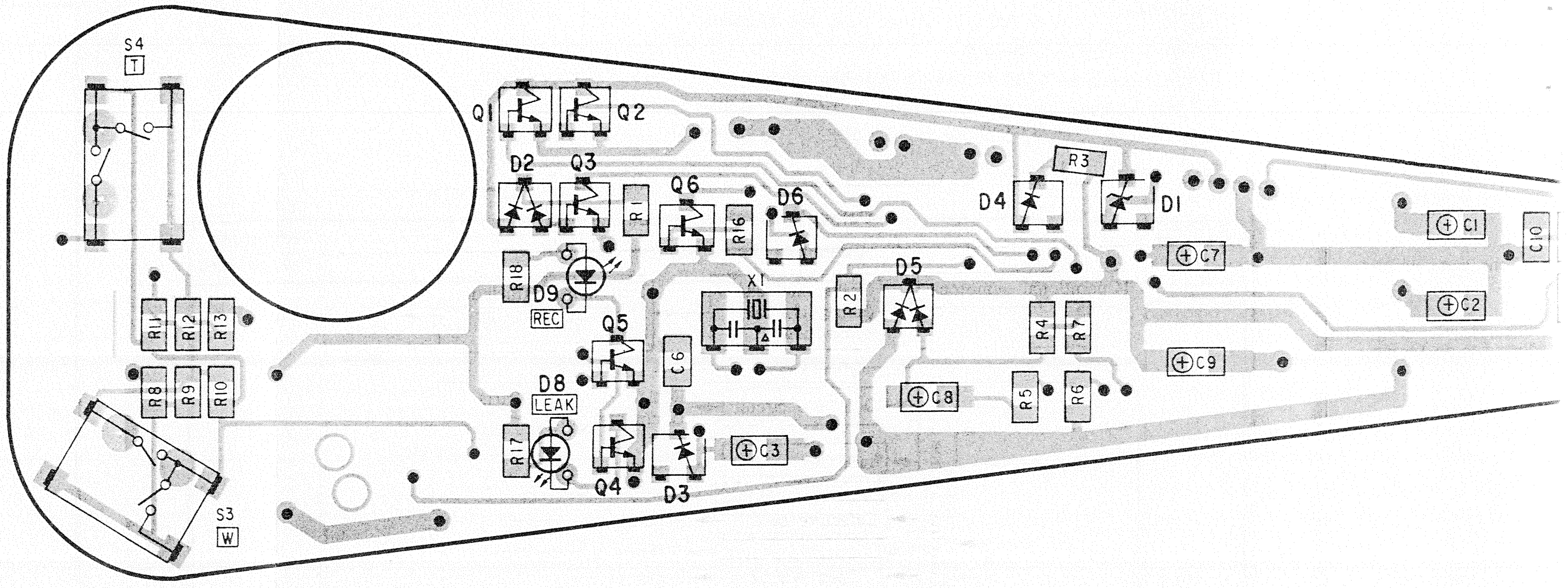
For printed wiring boards :

- ○— : indicates a lead wire mounted on the componet side.
- ● : Through hole.
- ▨ : Pattern from the side which enables seeing.
(The other layers' patterns are not indicated)

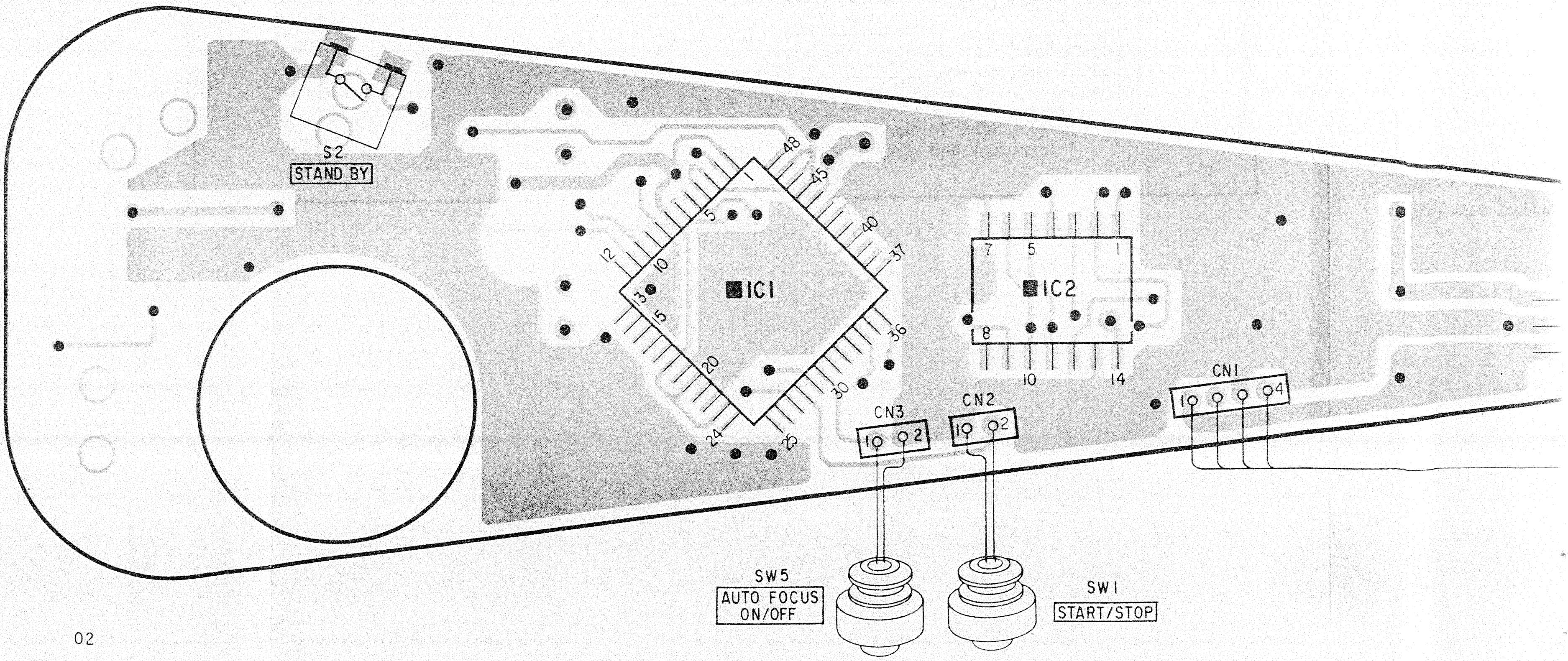
Caution :
Pattern face side (Conductor Side) : Parts on the pattern face side seen from the pattern face are indicated.
Parts face side : (Component side) Parts on the parts face side seen from the parts face are indicated.

2-2. PRINTED WIRING BOARDS **LM-48** **LM-44** (Ref. No. LM-48 BOARD : 1,000 Series)

LM-48 BOARD (CONDUCTOR SIDE)


S4
T
Q1
Q2
D2
Q3
Q6
D6
R1
R16
R3
D4
D1
C1
C10
C7
C2
D5
R2
X1
R18
D9
REC
Q5
C6
D8
LEAK
R17
Q4
D3
C3
C8
R4
R7
R5
R6
C9
R11
R12
R13
R8
R9
R10
S3
W

LM-48 BOARD (COMPONENT SIDE)

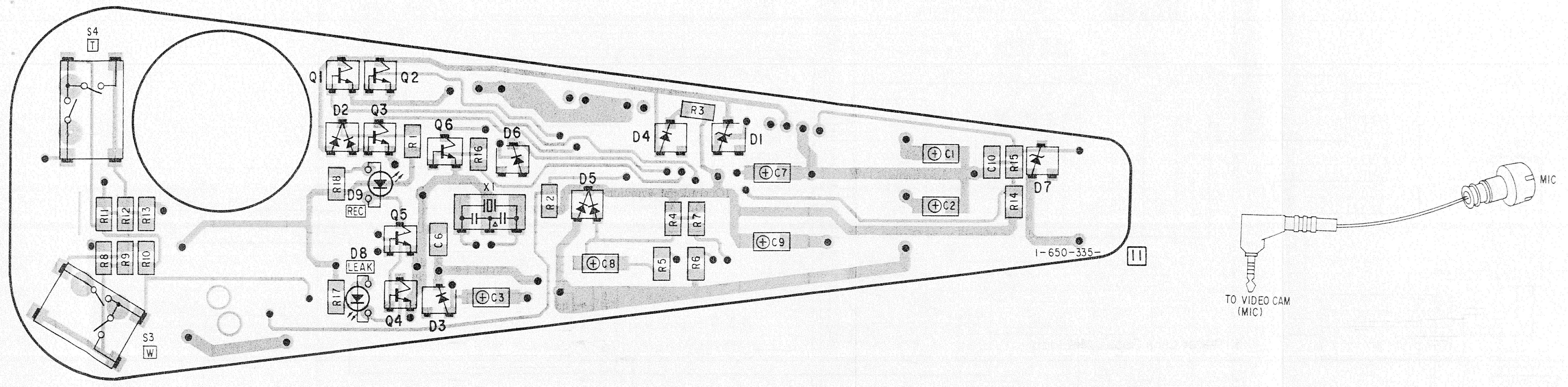

S2
STAND BY
IC1
1
5
10
12
13
15
20
24
25
30
36
37
40
45
48
IC2
7
5
1
8
10
14
CN3
CN2
CN1
SW5
AUTO FOCUS ON/OFF
SW1
START/STOP
02

RINTED WIRING BOARDS LM-48 LM-44

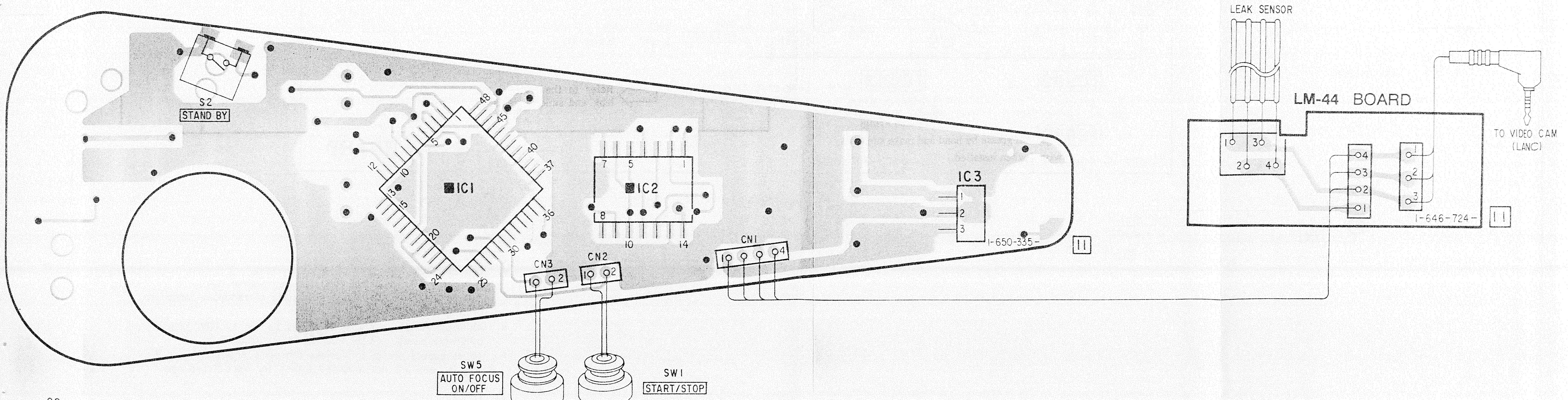
(Ref. No. LM-48 BOARD : 1,000 Series)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

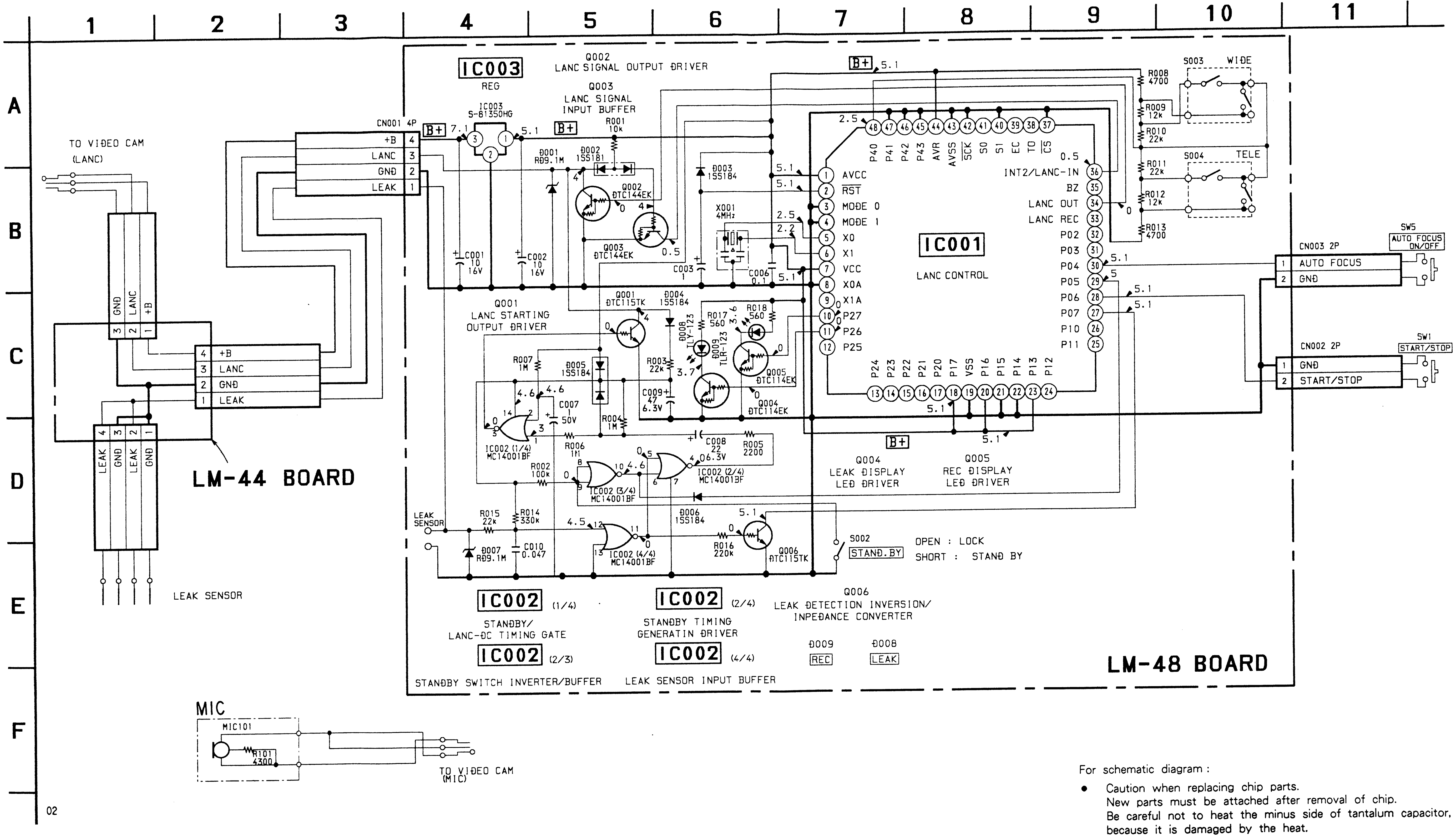
LM-48 BOARD (CONDUCTOR SIDE)


S4
T
Q1
Q2
D2
Q3
Q6
D6
R3
D4
D1
R1
R16
C1
C10
R15
D7
R18
D9
REC
X1
R2
D5
C7
R4
R7
C2
R14
R11
R12
R13
Q5
C6
C9
R8
R9
R10
D8
LEAK
C8
R5
R6
1-650-335-
11
R17
Q4
D3
C3
S3
W
MIC
TO VIDEO CAM
(MIC)

LM-48 BOARD (COMPONENT SIDE)


S2
STAND BY
48
45
40
37
36
30
25
24
20
15
13
12
10
5
1
IC1
7
5
1
IC2
8
10
14
IC3
1
2
3
1-650-335-
11
CN1
1
4
CN3
1
2
CN2
1
2
SW5
AUTO FOCUS
ON/OFF
SW1
START/STOP
LEAK SENSOR
LM-44 BOARD
1
3
2
4
4
3
2
1
1
2
3
1-646-724-
11
TO VIDEO CAM
(LANC)

2-3. SCHEMATIC DIAGRAM **LM-48** **LM-44** (Ref. No. LM-48 BOARD : 1,000 Series)


1
2
3
4
5
6
7
8
9
10
11
A
B
C
D
E
F
TO VIDEO CAM (LANC)
LM-44 BOARD
LEAK SENSOR
+B
LANC
GND
LEAK
CN001 4P
IC003 REG
IC003 S-81350HG
Q002 LANC SIGNAL OUTPUT DRIVER
Q003 LANC SIGNAL INPUT BUFFER
R001 10k
D001 RD9.1M
D002 1SS181
Q002 DTC144EK
Q003 DTC144EK
C001 10 16V
C002 10 16V
D003 1SS184
X001 4MHz
C003 1
C006 0.1
Q001 LANC STARTING OUTPUT DRIVER
Q001 DTC115TK
D004 1SS184
R017 560
R018 560
D008 TLY-123
D009 TLR-123
Q005 DTC114EK
Q004 DTC114EK
R007 1M
D005 1SS184
C007 1 50V
R003 22k
C009 47 6.3V
R004 1M
IC002 (1/4) MC14001BF
R006 1M
R002 100k
IC002 (3/4) MC14001BF
C008 22 6.3V
R005 2200
IC002 (2/4) MC14001BF
LEAK SENSOR
R015 22k
R014 330k
D007 RD9.1M
C010 0.047
IC002 (4/4) MC14001BF
D006 1SS184
R016 220k
Q006 DTC115TK
S002 STAND.BY
OPEN : LOCK
SHORT : STAND BY
IC001 LANC CONTROL
AVCC
RST
MODE 0
MODE 1
X0
X1
VCC
X0A
X1A
P27
P26
P25
P40 P41 P42 P43 AVR AVSS SCK SO SI EC TO CS
INT2/LANC-IN
BZ
LANC OUT
LANC REC
P02 P03 P04 P05 P06 P07 P10 P11
P24 P23 P22 P21 P20 P17 VSS P16 P15 P14 P13 P12
R008 4700
R009 12k
R010 22k
R011 22k
R012 12k
R013 4700
S003 WIDE
S004 TELE
CN003 2P
AUTO FOCUS
GND
SW5 AUTO FOCUS ON/OFF
CN002 2P
GND
START/STOP
SW1 START/STOP
Q004 LEAK DISPLAY LED DRIVER
Q005 REC DISPLAY LED DRIVER
IC002 (1/4) STANDBY/ LANC-DC TIMING GATE
IC002 (2/3) STANDBY SWITCH INVERTER/BUFFER
IC002 (2/4) STANDBY TIMING GENERATIN DRIVER
IC002 (4/4) LEAK SENSOR INPUT BUFFER
Q006 LEAK DETECTION INVERSION/ INPEDANCE CONVERTER
D009 REC
D008 LEAK
LM-48 BOARD
MIC
MIC101
R101 4300
TO VIDEO CAM (MIC)
02

For schematic diagram :

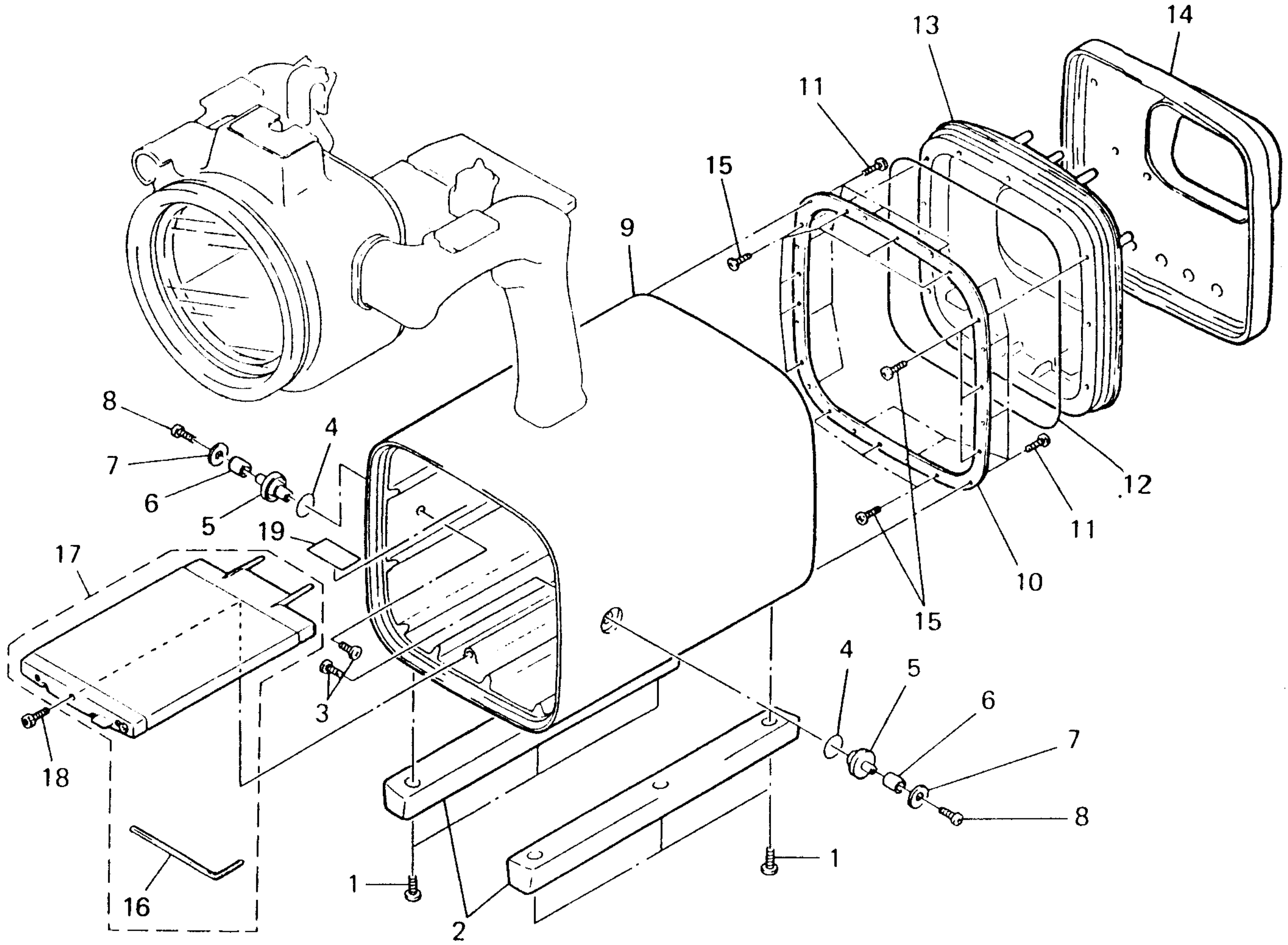
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, chip resistors are 1/10W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ.
- All capacitors are in μF unless otherwise noted. pF : μμF. 50V or less are not indicated except for electrolytics and tantalums.
- B+ : B+ line.
- Readings are taken with a digital multimeter (DC10MΩ).

MPK-TRA2/TRA2K

SECTION 3
EXPLODED VIEWS

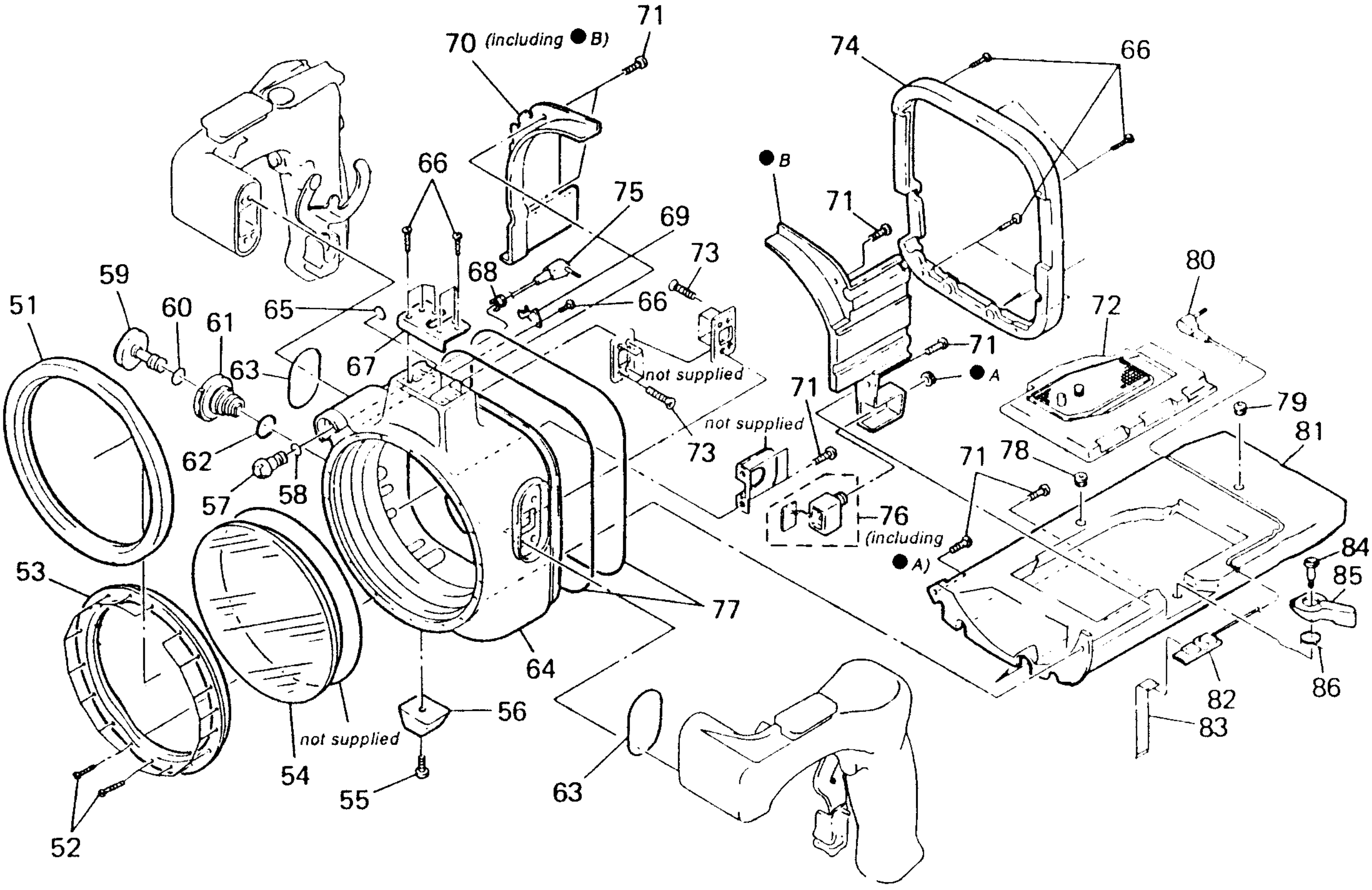
NOTE :
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

3-1. MAIN SECTION-1



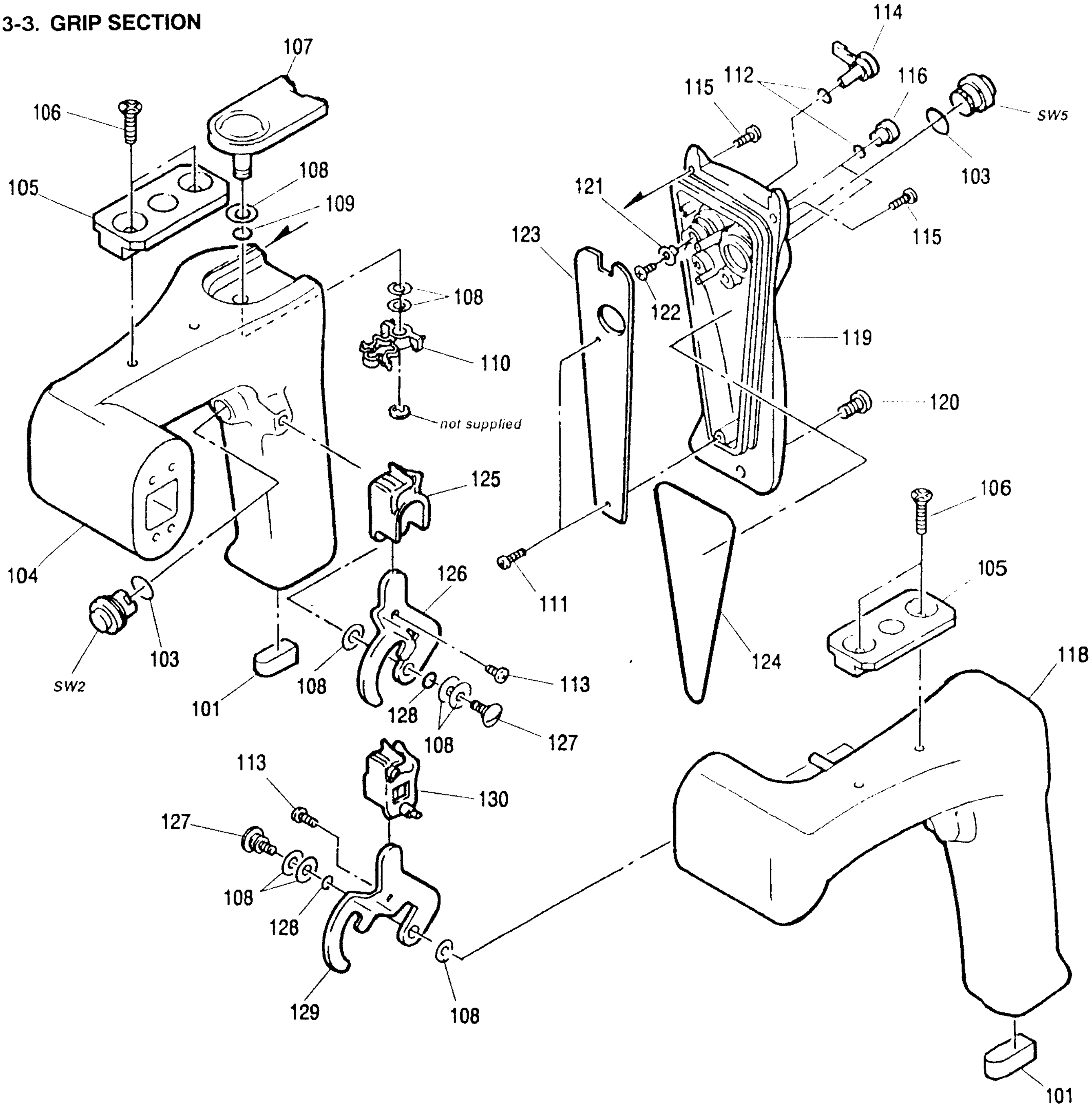
Ref. No.	Part No.	Description	Remark
1	3-950-861-01	SCREW (M4X6)	
2	3-952-922-01	GUIDE, PIPE	
3	3-951-373-01	SCREW (M5X6), PLUS (BV)	
4	3-950-858-01	RING (P-9), O	
5	3-950-859-01	PIN, LOCK	
6	3-952-626-01	COLLAR, LOCK PIN	
7	3-952-627-01	WASHER	
8	3-952-629-01	SCREW (M3X5)	
9	3-952-921-11	PIPE, MIDWAY	
* 10	3-952-920-01	PLATE, FIXED, REAR COVER	
11	3-950-857-01	SCREW (M2X5)	
12	3-952-928-01	RING (GS-165), O	
13	3-952-917-01	COVER, REAR	
14	3-952-918-01	PROTECTOR, REAR	
15	2-115-925-01	SCREW (2) (M2X5), TAPPING	
16	3-952-942-01	WRENCH, HEXAGON	
17	X-3942-700-1	WEIGHT ASSY, BALANCE	
18	2-186-308-11	BOLT (M4X15), HOLE, HEXAGON	
19	3-953-857-01	LABEL, CAUTION	

3-2. MAIN SECTION-2


70 (including ●B)
71
74
66
●B
66
75
69
71
73
80
59
68
66
51
60
61
65
72
63
67
not supplied
71
●A
79
71
not supplied
73
81
71
78
62
57
58
76
(including ●A)
84
53
85
77
64
86
82
83
56
not supplied
54
55
63
52

Ref. No.	Part No.	Description	Remark
51	3-952-932-01	PROTECTOR, FRONT	
52	2-115-925-21	SCREW (M2X8)	
53	3-952-930-01	RETAINER, FRONT GLASS	
54	3-952-931-01	GLASS, FRONT	
55	3-952-934-01	SCREW (M3X12) (B TIGHT)	
* 56	3-952-933-01	PROTECTOR	
57	X-3942-405-1	MICROPHONE ASSY, UNDERWATER	
58	3-950-907-01	RING (S-8), O	
59	3-951-375-01	CAP, CONNECTOR	
60	3-950-888-01	RING (P-11), O	
61	X-3942-407-1	TERMINAL ASSY, OUTER	
62	3-950-847-01	RING (P-20), O	
63	3-950-844-01	RING (JASO2031), O	
64	3-952-923-01	CASE, FRONT	
65	3-950-846-01	RING (P-7), O	
66	2-115-925-01	SCREW (2) (M2X5), TAPPING	
* 67	3-952-924-01	SHOE, ACCESSORY	
68	3-950-869-01	BUSHING, RUBBER	
* 69	3-952-927-01	PLATE, FIXED, MICROPHONE	
* 70	3-952-925-11	COVER, FRONT CASE INNER(including ●B)	
71	2-186-307-01	SCREW (M3X8)	
72	X-3944-249-1	BASE ASSY, CAMERA	
73	3-950-849-01	SCREW (M4X16)	
* 74	3-952-929-01	RING, REINFORCEMENT	
75	1-696-932-21	CORD, CONNECTION(MIC)	
76	1-951-214-21	HARNESS, VIDEO RELAY(including ●A)	
77	3-952-928-01	RING (GS-165), O	
78	3-950-854-01	BUSHING, RUBBER	
79	3-306-006-00	CUSHION, MOTOR	
80	1-696-933-41	CORD, CONNECTION(LANC)	
81	3-959-696-01	BASE, MAIN	
* 82	1-646-724-11	LM-44 BOARD	
83	1-696-021-31	WIRE(LEAK SENSOR)	
84	2-181-672-01	SHAFT, LOCK LEVER	
85	2-181-677-01	LEVER, LOCK	
86	3-952-940-01	SPRING, LOCK LEVER	

3-3. GRIP SECTION


107
106
105
108
109
108
110
not supplied
104
103
SW2
101
108
125
126
113
128
108
127
113
127
108
128
130
129
108
114
115
112
116
SW5
103
121
115
123
122
119
120
111
124
106
105
118
101

Ref. No.	Part No.	Description	Remark
101	2-182-594-01	FOOT, RUBBER	
103	3-950-888-01	RING (P-11), O	
104	3-950-882-01	GRIP, R	
105	2-115-923-01	SHOE, BRACKET	
106	3-950-884-01	SCREW (M5X15)	
107	3-950-891-01	KNOB, ZOOM	
108	3-952-079-01	WASHER, THRUST	
109	3-950-887-01	RING (P-4), O	
* 110	3-957-183-01	SPRING, ZOOM LEVER	
111	2-115-925-01	SCREW (2) (M2X5), TAPPING	
112	3-950-880-01	RING (S-4), O	
113	2-398-048-11	SCREW (2.6X8), TAPPING, +P	
114	3-950-890-01	KNOB, POWER	
115	3-954-960-01	SCREW (M3X6), DAMPER	
116	3-950-896-01	WINDOW, LED	
118	3-950-878-01	GRIP, L	
119	3-950-885-11	COVER, GRIP (R)	
120	3-954-959-01	SCREW (M5X12), DAMPER	
* 121	3-957-184-01	LEVER, POWER	
122	3-950-895-01	SCREW (M1.7X3) (BT)	
* 123	A-7071-942-A	LM-48 BOARD, COMPLETE	
124	3-950-886-01	RING, O	
125	3-950-875-01	COVER (R), CAM	
126	3-950-872-01	CAM (R), LOCK	
127	3-950-874-01	PIN, LOCK CAM	
128	2-115-924-91	RING, O	
129	3-950-873-01	CAM (L), LOCK	
130	3-950-876-01	COVER (L), CAM	
SW2	X-3942-410-1	BUTTON ASSY, REC	
SW5	X-3942-412-1	BUTTON ASSY, AF SELECTION	

MPK-TRA2/TRA2K

LM-44 **LM-48**

SECTION 4
ELECTRICAL PARTS LIST

NOTE :
- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms
  METAL : Metal-film resistor
  METAL OXIDE : Metal oxide-film resistor
  F : nonflammable
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u : μ , for example :
  uA.... : μ A.... , uPA.... : μ PA....
  uPB.... : μ PB.... , uPC.... : μ PC....
  uPD.... : μ PD....
- CAPACITORS
  uF : μ F
- COILS
  uH : μ H

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description	Remark
*	1-646-724-11	LM-44 BOARD ***********	
*	1-564-719-11	PIN, CONNECTOR (SMALL TYPE) 3P	
*	1-565-215-11	SOCKET, CONNECTOR 4P	
*	1-566-759-11	PIN, CONNECTOR (PC BOARD) 4P BOARD	
**			
*	A-7071-942-A	LM-48 BOARD, COMPLETE ******************** (Ref. No. 1000 series)	
		< CAPACITOR >	
C001	1-124-779-00	ELECT CHIP 10uF 20% 16V	
C002	1-124-779-00	ELECT CHIP 10uF 20% 16V	
C003	1-126-193-11	ELECT 1uF 20% 50V	
C006	1-163-038-00	CERAMIC CHIP 0.1uF 25V	
C007	1-126-193-11	ELECT 1uF 20% 50V	
C008	1-124-778-00	ELECT CHIP 22uF 20% 6.3V	
C009	1-126-205-11	ELECT CHIP 47uF 20% 6.3V	
C010	1-163-035-00	CERAMIC CHIP 0.047uF 50V	
		< CONNECTOR >	
* CN001	1-566-759-11	PIN, CONNECTOR (PC BOARD) 4P	
CN002	1-566-757-11	PIN, CONNECTOR (PC BOARD) 2P	
CN003	1-566-757-11	PIN, CONNECTOR (PC BOARD) 2P	
		< DIODE >	
D001	8-719-106-44	DIODE RD9.1M-B2	
D002	8-719-820-05	DIODE 1SS181	
D003	8-719-801-78	DIODE 1SS184	
D004	8-719-801-78	DIODE 1SS184	
D005	8-719-801-78	DIODE 1SS184	
D006	8-719-801-78	DIODE 1SS184	
D007	8-719-106-44	DIODE RD9.1M-B2	
D008	8-719-812-32	LED TLY123(LEAK)	
D009	8-719-812-31	LED TLR123(REC)	
		< IC >	
IC001	8-759-197-90	IC MB89131-149	
IC002	8-759-008-74	IC MC14001BF	
IC003	8-759-512-69	IC S-81350HG-KD	

Ref. No.	Part No.	Description	Remark
		< TRANSISTOR >	
Q001	8-729-023-52	TRANSISTOR DTC115TK-T146	
Q002	8-729-901-01	TRANSISTOR DTC144EK	
Q003	8-729-901-01	TRANSISTOR DTC144EK	
Q004	8-729-900-53	TRANSISTOR DTC114EK	
Q005	8-729-900-53	TRANSISTOR DTC114EK	
Q006	8-729-023-52	TRANSISTOR DTC115TK-T146	
		< RESISTOR >	
R001	1-216-073-00	METAL CHIP 10K 5% 1/10W	
R002	1-216-097-00	METAL CHIP 100K 5% 1/10W	
R003	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R004	1-216-121-00	METAL CHIP 1M 5% 1/10W	
R005	1-216-057-00	METAL CHIP 2.2K 5% 1/10W	
R006	1-216-121-00	METAL CHIP 1M 5% 1/10W	
R007	1-216-121-00	METAL CHIP 1M 5% 1/10W	
R008	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R009	1-216-075-00	METAL CHIP 12K 5% 1/10W	
R010	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R011	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R012	1-216-075-00	METAL CHIP 12K 5% 1/10W	
R013	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R014	1-216-109-00	METAL CHIP 330K 5% 1/10W	
R015	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R016	1-216-105-00	METAL CHIP 220K 5% 1/10W	
R017	1-216-043-00	METAL CHIP 560 5% 1/10W	
R018	1-216-043-00	METAL CHIP 560 5% 1/10W	
		< SWITCH >	
S002	1-572-688-11	SWITCH, PUSH (1 KEY)(STANDBY)	
S003	1-692-247-11	SWITCH, TACTIL (2 CLICK)(W)	
S004	1-692-247-11	SWITCH, TACTIL (2 CLICK)(T)	
		< CRYSTAL >	
X001	1-579-902-11	VIBRATOR, CERAMIC(4MHz)	
**			

Ref. No.	Part No.	Description	Remark
		MISCELLANEOUS *************	
75	1-696-932-21	CORD, CONNECTION(MIC)	
76	1-951-214-21	HARNESS, VIDEO RELAY(including ●A)	
80	1-696-933-41	CORD, CONNECTION(LANC)	
83	1-696-021-31	WIRE(LEAK SENSOR)	
SW2	X-3942-410-1	BUTTON ASSY, REC	
SW5	X-3942-412-1	BUTTON ASSY, AF SELECTION	
		**	
		ACCESSORIES & PACKING MATERIALS *******************************	
		MPK-TRA2 only(US,Canadian,AEP,UK)	
	2-115-921-01	GREASE	
	3-681-190-01	SHEET (LARGE), PROTECTION	
	3-759-064-11	MANUAL, INSTRUCTION (ENGLISH/FRENCH/SPANISH)	
	3-759-064-41	MANUAL, INSTRUCTION(GERMAN/DUTCH/SWEDISH/ITALIAN)(TRA2:AEP, UK/TRA2K)	
	3-759-064-51	MANUAL, INSTRUCTION(CHINESE/ARABIC) (TRA2:AEP, UK/TRA2K)	
	3-952-928-01	RING (GS-165), O	
*	3-952-980-01	INDIVIDUAL CARTON(TRA2)	
*	3-953-232-01	CUSHION (UPPER)(TRA2)	
*	3-953-233-01	CUSHION (LOWER)(TRA2)	
		MPK-TRA2K (MPK-TRA2 + CARRYING CASE)(AEP,UK)	
	2-115-921-01	GREASE	
	3-681-190-01	SHEET (LARGE), PROTECTION	
	3-759-064-11	MANUAL, INSTRUCTION (ENGLISH/FRENCH/SPANISH)	
	3-759-064-41	MANUAL, INSTRUCTION(GERMAN/DUTCH/SWEDISH/ITALIAN)(TRA2:AEP, UK/TRA2K)	
	3-759-064-51	MANUAL, INSTRUCTION(CHINESE/ARABIC) (TRA2:AEP, UK/TRA2K)	
*	3-951-245-51	INDIVIDUAL CARTON(TRA2K)	
*	3-951-367-01	CASE (MAIN), CARRYING(TRA2K)	
	3-951-368-01	CUSHION (UPPER)(TRA2K)	
	3-951-369-01	CUSHION (LOWER)(TRA2K)	
	3-951-370-01	KEY(TRA2K)	
	3-951-371-01	BELT, CARRYING(TRA2K)	
*	3-951-448-01	CUSHION(TRA2K)	
	3-952-928-01	RING (GS-165), O	
	A-6776-242-A	FINDER(TR900)BLOCK ASSY, SPORTS (TRA2K)	
	A-6776-243-A	FINDER BLOCK ASSY, SPORTS(TRA2K)	